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POLLUTION OF THE INTERSTATE WATERS OF THE GRAND CALUMET RIVER, LITTLE CALUMET RIVER, CALUMET RIVER, WOLF LAKE, LAKE MICHIGAN AND THEIR TRIBUTARIES. PROCEEDINGS OF CONFERENCE, SECOND SESSION, HELD AT CHICAGO, ILLINOIS ON SEPTEMBER 11, 1967. VOLUME 1

Federal Water Pollution Control Administration
Washington, D. C.

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PROCEEDINGS
Volume 1

SECOND SESSION
September 11, 1967

PROGRESS EVALUATION MEETING

In the matter of Pollution of the Interstate Waters of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan and their Tributaries

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U.S. Department of Interior—Federal Water Pollution Control Administration

641

CONTENTS

PAGE:

Opening Statement
by Murray Stein 5

Closing Statements 561

Hon. Richard J. Daley 9

Hon. Ray J. Madden 16

H. W. Poston 21

Col. S. B. Warner 24

Robert J. Bowden 29

Grover Cook 176

Dr. Roland Smith 192

James C. Vaughn 206

Perry E. Miller 223

Clarence W. Klassen 271

John E. Egan 292

Vinton W. Bacon 522

Progress Meeting in the Matter of Pollution of the Interstate Waters of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan and their Tributaries, held at the Ceremonial Courtroom, New Federal Building, Jackson and Adams Streets, Chicago, Illinois, on September 11, 1967, at 9:10 a.m.

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior.

CONFEREES:

H. W. Poston, Regional Director, Federal Water Pollution Control Administration, Department of the Interior, Chicago, Illinois

John E. Egan, President, The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois

Blucher A. Poole, Technical Secretary, Indiana Stream Pollution Control Board, Indianapolis, Indiana

CONFEREES (Continued):

Clarence W. Klassen, Technical Secretary, Illinois Sanitary Water Board, Springfield, Illinois

AIDES TO ABOVE:

Vinton W. Bacon, General Superintendent, The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois

Perry E. Miller, Assistant Director, Division of Sanitary Engineering, Indiana State Board of Health, Indianapolis, Indiana

Douglas B. Morton, Chief, Bureau of Stream Pollution Control, Illinois Department of Public Health, Springfield, Illinois

PARTICIPANTS:

Hon. Richard J. Daley, Mayor of the City of Chicago, Illinois

Hon. Ray J. Madden, Member of Congress from the First Congressional District of Indiana

H. W. Poston, Conferee and Regional Director, Federal Water Pollution Control Administration, Department of the Interior, Chicago, Illinois

Colonel E. B. Warner, Chief, Engineer Division, Headquarters Fifth United States Army

Robert J. Bowden, Director of the Calumet Area Surveillance Project, Federal Water Pollution Control Administration, Department of the Interior, Chicago, Illinois

Grover Cook, Chief, Regional Office, Enforcement Activities, Federal Water Pollution Control Administration, Department of the Interior, Chicago, Illinois

Dr. Roland Smith, Assistant Director for Biological Research, Bureau of Commercial Fisheries, Department of the Interior

James C. Vaughn, Engineer of Water Purification, Bureau of Water, Department of Water and Sewers, City of Chicago, Illinois

Perry Miller, Assistant Director, Division of Sanitary Engineering, Indiana State Board of Health, Indianapolis, Indiana

PARTICIPANTS (Continued):

Clarence W. Klassen, Conferee and Technical Secretary, Illinois Sanitary Water Board, Springfield, Illinois.

John E. Egan, Conferee and President of the Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois

Vinton W. Bacon, General Superintendent, The Metropolitan Sanitary District of Greater Chicago, Chicago, Illinois

THOSE IN ATTENDANCE:

Richard P. Anderson, Argonne National Laboratory, Argonne, Illinois

Mrs. H. L. Arenson, Jr., Glencoe League of Women Voters, 1010 Eastwood Road, Glencoe, Illinois

Frank Armour, Vice President, Engineering, Interlake Steel Corporation, 310 S. Michigan, Chicago, Illinois

Vinton W. Bacon, General Superintendent, Metropolitan Sanitary District of Greater Chicago, 100 East Erie Street, Chicago, Illinois 60611

THOSE IN ATTENDANCE (Continued):

Mrs. C. S. Barrett, Water Resources, Chicago League of Women Voters, 5756 Blackstone Avenue, Chicago, Illinois 60637

Lawrence P. Beer, Hydraulic Engineer, Commonwealth Edison Company, 72 West Adams, Chicago, Illinois

Irving Bernstein, Chemical Engineer, Federal Water Pollution Control Administration, 33 E. Congress Parkway, Chicago, Illinois 60605

Mrs. Russell Borgings, Jr., League of Women Voters, Chairman, Lake Michigan Inter-League Group, 1120 Chestnut Avenue, Wilmette, Illinois 60091

Austin Boyle, Assistant Secretary, E. C. Manufacturers Association, 900 E. Chicago Avenue, East Chicago, Indiana 46312

John R. Brough, Director, Air and Water Control, Inland Steel Company, 3210 Watling Street, East Chicago, Indiana

William D. Calhoun, Governmental Affairs Representative, Youngstown Sheet and Tube Company, Riley and Dickey Roads, East Chicago, Indiana

B. W. Capek, Assistant to Executive Vice President, Union Tank Car Company, 111 West Jackson Boulevard, Chicago, Illinois

J. Roland Carr, Regional Editor, Engineering News Record, 645 North Michigan Avenue, Chicago, Illinois 60611

THOSE IN ATTENDANCE (Continued):

Joseph T. Chantigney, General Vice Chairman, Cook County Clean Streams Committee, 14823 Evers Street, Dolton, Illinois 60419

Daniel Chorowicki, Aquatic Sampler, Federal Water Pollution Control Administration, 1819 Pershing Road, Chicago, Illinois

A. J. Cochrane, Assistant to Vice President, Youngstown Sheet and Tube Company, 69 West Washington Street, Chicago, Illinois

Richard J. Daley, Mayor, City of Chicago

William J. Degutis, Monitor Technician, Federal Water Pollution Control Administration, 1819 Pershing Road, Chicago, Illinois

Herbert J. Dunsmore, Assistant to Administrative Vice President - Engineering, U. S. Steel, 525 William Penn Place, Pittsburgh, Pennsylvania 15230

S. A. Foust, Engineer, Union Carbide, P. O. Box 750, Whiting, Indiana

James A. Fowler, Technical Assistant, Sinclair Refining Company, 3500 Indianapolis Boulevard, East Chicago, Indiana

Merrill B. Gamet, Federal Activities Coordinator, Federal Water Pollution Control Administration, 33 East Congress Parkway, Chicago, Illinois 60605

THOSE IN ATTENDANCE (Continued):

George Gockstetter, Superintendent, Republic Steel Corporation, 11600 Burley Avenue, Chicago, Illinois 60617

Mrs. Gilbert Goodfriend, League of Women Voters, 9704 S. Merrion Avenue, Chicago, Illinois

C. Fred Gurnham, Professor, Illinois Institute of Technology, Chicago, Illinois 60616

James F. Grutsch, Coordinator of Waste Disposal, American Oil Company, 910 South Michigan, Chicago, Illinois

Frank E. Hall, Planning and Program Grants Officer, Federal Water Pollution Control Administration, 33 E. Congress Parkway, Chicago, Illinois 60605

Robert A. Hirshfield, Chairman, Water Resources Committee, Chicago Association of Commerce and Industry, Inland Steel Building, Chicago, Illinois

D. D. Hunter, General Attorney, U. S. Steel, 208 S. LaSalle Street, Chicago, Illinois

Ruth Irvine, League of Women Voters, 311 Moccasin, Buchanan, Michigan

George F. Jackson, Research Chemist, Cities Service Oil Company, Box No. 718, East Chicago, Indiana

James W. Jardine, Commissioner of Water and Sewers, City of Chicago, Room 403, City Hall, Chicago, Illinois

THOSE IN ATTENDANCE (Continued):

Raymond D. Johnson, Deputy Commissioner for Water, Department of Water and Sewers, Room 404, City Hall, Chicago, Illinois 60602

Mrs. Eileen Johnston, Water Resources, League of Women Voters, 505 Maple Avenue, Wilmette, Illinois

Mrs. Morrie Kaplan, League of Women Voters, 8901 Lake Shore Drive, Gary, Indiana

Laurel Koertgen, Water Resources Chairman, League of Women Voters, 5149 Howard, Skokie, Illinois

Leslie Kozlowski, Secretary, Federal Water Pollution Control Administration, 33 East Congress Parkway, Chicago, Illinois

Fred G. Krikau, Environmental Control Engineer, Interlake Steel Corporation 135th and Perry, Chicago, Illinois 60627

T. E. Larson, Head, Chemical Section, Illinois State Water Survey, Box 232, Urbana, Illinois 61801

Benn J. Leland, Sanitary Engineer, Illinois State Sanitary Water Board, 1919 W. Taylor Street, Chicago, Illinois 60612

Harry R. Macdonald, Plant Manager, Lever Brothers Company, 1200 Calumet Avenue, Hammond, Indiana 46320

Gerald Marks, Trustee, Metropolitan Sanitary District of Greater Chicago, 100 East Erie Street, Chicago, Illinois 60608

THOSE IN ATTENANCE (Continued):

J. O. McDonald, Regional Construction Grants Program Director, Federal Water Pollution Control Administration, 33 East Congress Parkway, Chicago, Illinois 60605

Fran McGeachie, Reporter, City News Bureau, 188 W. Randolph, Chicago, Illinois

J. Edward Meers, Superintendent - Manager, Sanitary District of Bloom Township, P. O. Box 251, Chicago Heights, Illinois 60411

Henry A. Miller, Co-Chairman, Lower Des Plaines Cook County Clean Streams Committee, 23 Longcommon Road, Riverside, Illinois

D. B. Morton, Chief, Bureau of Stream Pollution Control, Illinois State Sanitary Water Board, 616 State Office Building, Springfield, Illinois 62706

Richard S. Nelle, Sanitary Engineer, Illinois Department of Public Health, 616 State Office Building, Springfield, Illinois 62706

Frank J. O'Donnell, Engineer Sewer Construction and Maintenance, Department of Water and Sewers, Room 408, City Hall, Chicago, Illinois

Richard A. Pavia, Assistant Commissioner, Department of Water and Sewers, Room 403, City Hall, Chicago, Illinois

THOSE IN ATTENDANCE (Continued):

Ernest D. Premetz, Deputy Regional Director, Bureau of Commercial Fisheries, U. S. Department of the Interior, 5 Research Drive, Ann Arbor, Michigan 48103

Peter P. Picchi, Auditor, U. S. General Accounting Office, 610 South Canal Street, Chicago, Illinois 60607

Clifford Risley, Jr., Director, Chicago Program Office, Federal Water Pollution Control Administration, 1819 W. Pershing Road, Chicago, Illinois

Mrs. Samuel Rome, Water Resources Chairman, League of Women Voters, 67 E. Madison, Chicago, Illinois 60603

R. J. Schneider, Deputy Regional Director, Federal Water Pollution Control Administration, 33 East Congress Parkway, Chicago, Illinois 60605

Roger G. Seaman, Administrative Assistant to President, Metropolitan Sanitary District of Greater Chicago, 100 East Erie, Chicago, Illinois

Donald R. Shiras, Manager, Public Information, Inland Steel Company, 30 West Monroe, Chicago, Illinois

Jerome E. Stein, Director of Research and Development, Metropolitan Sanitary District of Greater Chicago, 100 East Erie, Chicago, Illinois

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THOSE IN ATTENDANCE (Continued):

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Mrs. Donald Trump, Chairman, Water Resources Director, League of Women Voters, R5 - Box 26, Valparaiso, Indiana 46383

James C. Vaughn, Engineer, Water Purification, Bureau of Water, 1000 East Ohio Street, Chicago, Illinois

DeYarman Wallace, Research Supervisor, Youngstown Sheet and Tube Company, P. O. Box 900, Youngstown, Ohio

Robert O. Waller, Chief Water Engineer, Bureau of Water, City of Chicago, Room 404, City Hall, Chicago, Illinois 60602

Rob Warden, Science Writer, Chicago Daily News, Chicago, Illinois

R. V. Weil, Assistant Manager, Engineering, Sinclair Refining Company, 410 East Sibley Boulevard, Harvey, Illinois

B. F. Willey, Director, Water Purification Lab, City of Chicago, 1000 East Ohio Street, Chicago, Illinois 60611

Loren P. Woods, Curator of Fishes, Field Museum of Natural History, Roosevelt Road and Field Drive, Chicago, Illinois

Charles L. Woody, Assistant to Manufacturing Superintendent, Lever Brothers, 1200 Calumet Avenue, Hammond, Indiana

PROCEEDINGS

OPENING STATEMENT
BY
MR. MURRAY STEIN

MR. STEIN: This is a meeting of the conferees representing the States of Indiana and Illinois, the Metropolitan Sanitary District of Greater Chicago, and the U. S. Department of the Interior. The purpose of this meeting is to evaluate progress toward water pollution control in the waters covered by the enforcement conference in the matter of pollution of the interstate waters of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan, and their tributaries.

The first session of the enforcement conference was held under the provisions of the Federal Water Pollution Control Act, on March 2-9, 1965. A technical session of the conference was held on January 4-5, 1966. The conferees then met in executive session on January 31 and February 1, 1966, and the conclusion of the conferees was announced at a public meeting on February 2, 1966. A progress evaluation meeting was held on March 15, 1967.

As you can see, we have put quite a bit of work in this area. I also think that we, the conferees at the table, and the industries involved, are way ahead of most of the areas in the country in dealing with water pollution control.

These conferees are Mr. John E. Egan, President of the Metropolitan Sanitary District of Greater Chicago; Mr. H. W. Poston, who is Regional Director for the Federal Water Pollution Control Administration, Department of the Interior, with headquarters in Chicago; Mr. Clarence W. Klassen, accompanied by Mr. Douglas Morton, of Illinois; and Mr. Blucher Poole, accompanied by Mr. Perry Miller, of Indiana.

My name is Murray Stein. I am from the Department of the Interior, Washington, D. C., and I am the representative of Secretary Stewart Udall.

We have not been quite as fortunate in other areas of the country as we are here in achieving unanimity of goals and of a program and a time schedule such as we have achieved in the area in the lower end of Lake Michigan. This in no small measure has been due to the long-time and cooperative effort placed in this program by the representatives of the agencies at this table, together with representatives of industry, notably the steel and petroleum industries. These people have labored long and hard in working out pollution control requirements for the area.

All of industry has indicated its desire to move ahead with this program. Much of the industry has made considerable progress. As a matter of fact, the petroleum industry has, to all intents and purposes, almost completed its program, and what we need is some surveillance.

Possibly a difficulty with the problem is that once we feel we have the program under way and the problem on the way towards solution, new problems crop up.

For example, we were struggling in the last few years to prevent bacterial contamination of the beaches. The Chicago beaches have remained open. We may have passed the crisis and turning point there where that has been halted. At least, it is not getting any worse.

Lo and behold, what are we faced with? Alewives and persistent and little algae known as cladophora. As a matter of fact, until a few months ago, unless you were a biologist, you probably did not know what cladophora was. When I first heard of it, I thought perhaps it was the end girl of the chorus of a Sophocles Greek play, but we find it is a problem.

Opening Statement - Mr. Stein

When I got to Chicago last night, I received the following telegram, which was addressed to me, which I would like to read:

> "My intense interest in the cause of Lake Michigan continues unabated. With Lake Erie in danger of death, it is unthinkable that we might lose another through neglect and the abuse of a few wasteful generations. I desire a complete progress report on the results of your Chicago meeting. Specifically I will be interested in action taken to carry pollution reduction measures recommended at the enforcement conference on March 2, 1965, and the technical session on January 4, 1966. Please inform everyone that we shall use every resource available to this Department to help save Lake Michigan.
>
> /s/ Stewart L. Udall
>
> Secretary of the Interior."

With this, you can see that our Department has given this the highest priority.

Though most of you are familiar faces, just briefly, let me say this: The Great Lakes are our single greatest fresh water resource, perhaps the single greatest fresh water resource in the world.

Lakes are a little different than rivers. Once they get polluted, we are not sure that, given all the money in the world or the best will in the world, we can restore them again. Once these Great Lakes go, I am not sure we are going to have anything left. If they do go, it will certainly change the entire economic base and structure of this area. As a matter of fact, it may even have repercussions on the position of the United States as a world power. There is no more important research job than to save the Great Lakes.

That is the theme of our discussion. The Secretary has evidenced his interest in this by the telegram, and the Department of the Interior and the Federal Government are here to do all they can.

At this point, we would like to take the opportunity of calling on Mayor Richard Daley of Chicago, who has just come in.

Mayor Daley.

STATEMENT OF THE HONORABLE RICHARD J. DALEY, MAYOR OF THE CITY OF CHICAGO, ILLINOIS

MAYOR DALEY: Thank you very much, Mr. Stein.

Hon. R. J. Daley

Mr. Chairman, Mr. Egan, Conferees and Ladies and Gentlemen:

As you know, the first Federal interstate hearing on Lake Michigan was called in March 1965 to discuss ways and means of preventing further deterioration of the southern end of the lake. The States of Indiana and Illinois, together with the Metropolitan Sanitary District of Greater Chicago, the City of Chicago, and concerned industrial and municipal representatives, joined with the Federal Water Pollution Control Administration to find a solution to this critical problem. Today, after approximately two and one-half years, the interstate hearing of March 1965 is generally classified as one of the most successful ever held. This was not by accident. This initial success was achieved through the sincere efforts of all the participants. We were encouraged by this cooperation but nevertheless we are deeply concerned that the objective set forth, namely the elimination of all pollution resulting from untreated discharges, by December 31, 1968, will not be met. Later today you will hear from the conferees representing both Illinois and Indiana, and they, in turn, will report in detail as to the progress which has been achieved.

In spite of the fact that prevention of water pollution has become a public crusade, there are still many who have to install the facilities necessary to achieve this objective. Everybody must understand that failure to comply will lead to strict enforcement.

Although areas of Lake Erie, Lake Ontario, and Lake Michigan have already deteriorated to the point where their use for water supply and recreation is severely threatened, there are still people who doubt that the situation we face is really a crisis. If we were to be guided by these persons, all of the Great Lakes would have to be destroyed before the public would be called upon to respond to the challenge. Fortunately, these people are few in number.

Water pollution in itself is not always visible, but the damaging effects are most conspicuous. Many of us have noticed the increased weed growth, the presence of objectionable algae, the nuisance of dead alewives or signs "No Swimming -- Polluted Beaches." Should any additional proof be needed to support our contention that Lake Michigan is deteriorating, I should like to report to you that over the past twenty years the problems of treating Lake Michigan water to the level of quality and purity necessary for public consumption have increased manyfold; and even more alarming, have increased at an accelerated rate. Problems which formerly were experienced only at the South Water Filtration Plant, located at 79th Street and Lake Michigan, are now becoming more frequent at the newly constructed Central Water Plant, located north of Navy Pier. Slugs of pollution which previously drifted only from the southern end of Lake Michigan are now, on occasion, reaching our plants from the north also. During this twenty-year period, the quantity of chlorine used to achieve the water safety which Chicago requires has increased from 15 pounds per million gallons to 25 pounds per million gallons, a 67% increase. The activated carbon dosage used to remove objectionable odors and tastes has increased from 24 to 41 pounds per million gallons and coagulants used to remove suspended matter from 103 to 119 pounds per million gallons. These represent increases of 71 and 15 percent, respectively. The cost of treatment with these chemicals has increased by 92 percent during this period. These findings cannot be disputed; they are, in fact, indications that pollution of Lake Michigan is increasing.

While we in Chicago are most proud of our heritage as a great city, and proud of our contributions to the science of sanitary engineering, in water filtration and treatment as well as waste water treatment, we recognize that we cannot rest on our accomplishments. Another battle over the fate of Lake Michigan is upon us, and we must use every weapon at our disposal. This means that we must attack all forms and sources of pollution, whether they emanate from industrial complexes, municipalities, or the commercial and pleasure craft which operate in our waters. Focusing all of our efforts on one group and ignoring the others is not only unfair, but will not yield the results we are seeking. For this reason, last Thursday we proposed to the Chicago City Council, amendments to Chicago's Harbor Code which will update and clarify the regulations we intend to use in preventing further pollution of the harbor of Chicago by pleasure craft and commercial vessels. It is not our intention that in seeking a solution to the problems of harbor pollution, we will resort to piecemeal measures which, in the long run, could result in greater costs to the community. Instead, we intend to promote the use of retention or recirculation devices which will prevent any pollution from vessels and pleasure craft being discharged into lake waters. The waste products will be collected, retained, and disposed of at appropriate shore-side facilities. This means that an extensive program will be required to develop enforcement measures as well as to provide adequate shore-side facilities in all of the harbors and boating marinas of Chicago in time for the 1968 boating season, when implementation and enforcement will begin. While this is no little task, we intend to carry it out.

We would like to encourage the other lake States, and particularly those bordering Lake Michigan, to consider similar action. Uniform regulations would greatly simplify accommodation and enforcement. In establishing Chicago's program to prevent harbor pollution, we have enlisted the advice and cooperation of the State of Illinois and the local office of the Federal Water Pollution Control Administration. Their support is most appreciated.

The City of Chicago is also in the process of examining new techniques which may prove useful in protecting Lake Michigan from pollution and preserving it as Chicago's most priceless asset. Over the last few months, efforts have been made to determine the feasibility of using aerial reconnaissance in conjunction with infrared photography or Laser techniques to measure water quality. The city is cooperating with other agencies in the study of alewife problems. Efforts are being made to consider ways and means of controlling the natural cycle by which all lakes, including Lake Michigan, age and die over a period of thousands of years, but with vastly accelerated rates through the effects of man-made pollution.

In conclusion, we would like to commend all of you for your past efforts to solve this problem, but all of us must understand that we are not yet doing enough. It is our belief that the efforts of all of us must be accelerated and intensified if the battle for Lake Michigan is to be won.

The City of Chicago stands ready to support any and all efforts to achieve this objective.

Thank you, Mr. Chairman, for the opportunity of appearing here.

MR. STEIN: Thank you, Mr. Mayor. Thank you for a truly comprehensive and sophisticated analysis of the problem.

With the cooperation and the understanding, such as we have had from Mayor Daley, we have hopes that we can preserve Lake Michigan and move forward to an abatement of the pollution problem.

Here we have a mayor of one of the largest cities in the country, thoroughly conversant with a very technical and a very difficult problem.

Thank you very much.

At this point we would like to call on Congressman Ray Madden of Indiana.

Congressman Madden has been an old friend. You know, now in Congress they passed the Water Pollution Control Bill practically unanimously, but there were times in the past when we squeaked through by one or two votes. At that time Congressman Madden was always a stalwart friend, and particularly in the Rules Committee he often provided the needed vote to get the legislation through.

I think as much as anyone in the country or in the Congress, Congressman Madden can be considered to be an architect and responsible for the Federal Water Pollution Control Program. Thank you, Congressman.

STATEMENT OF THE HONORABLE RAY J. MADDEN, MEMBER OF CONGRESS FROM THE FIRST CONGRESSIONAL DISTRICT OF INDIANA

CONGRESSMAN MADDEN: Thank you, Mr. Chairman, for those words.

Mayor Daley and Members of this Commission:

I have nothing prepared. I am on my way back to Washington after the recess, but I think that next to Vietnam, this question of water pollution and, you might add, air pollution, is the No. 1 menace that our Nation is facing.

I want to commend Mayor Daley for the great work that he and his aides have been doing in trying to solve the situation here in the Chicago-land area.

I made a statement in Congress eight or ten years ago that I represent the greatest industrial Congressional District in the United States, and Congressman Eberharter of Pittsburgh got up and asked if I knew that there was a town by the name of Pittsburgh. I said I realized there was a town by the name of Pittsburgh, but I asked, "How many Congressional Districts do you have there?" He said, "Five."

"Well," I said, "there is only one in the Calumet region of Indiana."

We here in Indiana and in the Calumet region in Chicago, of course, are joined. Our problem is mutual as far as pollution is concerned, and although this is a water pollution hearing, nevertheless air pollution is in about the same category.

I can state that if any civilized nation and all the people in the Nation realized what air pollution does to the health of humanity and to the health of the people generally, this question would have been handled years ago. It can be handled. There is nothing complex about these industries cooperating with the States and the Nation and the local communities, and putting all these great, progressive, modern inventions, and if they will cooperate, within five years from now we can purify the waters of every lake of the Great Lakes and a lot of these other areas over the Nation.

Water pollution in the Chicago-land area, which includes my district, affects everybody in the country. Over the years I venture to say that a great percentage of the people in this country, in the Middlewest especially, come into Chicago. It affects them.

Dr. Downing in Gary told me not long ago, "You go over the death lists in the Chicago, Gary, Hammond and East Chicago newspapers, and I sometimes wonder how much air and water pollution has added to that list over the years, day by day, month by month, when they drink this water that comes out of this lake."

You don't have to be a chemist to see it. You can taste it if you drink the water around here. Of course, we have done a great job, as far as science allows, to purify this water, but I have turned on the faucets in the hotels in Chicago and the hotels in Gary and in the homes down in my area, and the first thing that comes out of the faucet is a lot of dirt, and you don't know what it is, but that is because there is probably something wrong with the filtration system. We have great filtration systems, but sometimes they go wrong, and the health of the people is jeopardized by reason of that.

I do not want to take up any time here because I know you have a great schedule, but, in closing, let me say this:

I am not blaming anybody connected with these industries living in my area or living in Chicago, because some of these major industries -- and it is not confined to the major industries, but the automobile industry and the smaller industries can cooperate, and I think most of them are -- but there has not been much movement going on in the last two years since you gentlemen started. It is not your fault either. Those boys back in New York are at fault that control these big industries. It is not you boys who are out here representing them. You are doing the best you can, but I am going to make this statement:

I know something about the sentiment that is generated in Congress on this pollution problem, and that doesn't apply to the people, representatives and senators living in congested areas like our area, but it applies all over the Nation.

There is going to be legislation passed by the Congress of the United States to clean up pollution if the heads of these industries back in New York and in Chicago and in my area and throughout the country don't get behind this problem. They have got to get behind it, because, if they don't, there will be legislation passed and it will be cleaned up, but it will probably cost them a dollar where it will cost them about ten cents now if they will cooperate, pro rata speaking.

They have not moved so far in spite of all the publicity. The Mayor of East Chicago can testify to that.

Mayor Daley has done a great job, but we need help from the industries that are contributing to this thing. The cities are doing the best they can to cooperate, so let's all get together.

Thank you for the opportunity to say a few words.

MR. STEIN: Thank you very much, Congressman Madden, for an excellent statement.

Mayor Daley, I know you have a busy schedule, but I would like to just read the last sentence of a telegram I received last night in Chicago at the Palmer House from Secretary Udall, which I read before:

> "Please inform everyone that we shall use every resource available to this Department to help save Lake Michigan."

Now, you can be assured, and Secretary Udall has asked me to tell you, that any cooperation we can give you has the highest priority in our Department, and whatever our resources, our budget and the law will allow, we are ready to work with you on helping you solve the problem.

MAYOR DALEY: Thank you very much.

MR. STEIN: Thank you very much.

At this point, we would like to call on Mr. Poston for the Federal presentation.

I might point out that we will call for the Federal presentation first. Then we will call on the States and the Sanitary District of Chicago.

Mr. Poston.

STATEMENT OF H. W. POSTON, CONFEREE AND REGIONAL DIRECTOR, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, DEPARTMENT OF THE INTERIOR, CHICAGO, ILLINOIS

MR. POSTON: Mr. Chairman, Fellow Conferees, Ladies and Gentlemen:

At the March 15, 1967, progress meeting, the conferees agreed that progress was being made but there were strong indications that the industries in the conference area were not going to be in compliance with the schedule that called for construction completion by December 1968. Final engineering plans were to have been completed by June 1967. We expect to hear a report on this today. I am most anxious to hear from the other regulatory agencies as to whether or not the agreed upon deadlines have been met.

While obviously the major pollution is from municipal and industrial sources, I am equally anxious that the Federal agencies comply with the conference recommendations at the Nike Sites in the area. These are the only Federal pollution sources remaining. Colonel Warner of the Department of the Army is here today I think to give us a report on the status of these installations.

Both the Corps of Engineers and the Coast Guard have installed treatment devices on their boats, and the Coast Guard Indiana Harbor Light Station has installed secondary treatment.

Concerning pollution from dredging, we are working closely with the Corps of Engineers to find alternate methods of disposal of pollutional dredged materials. Although dredgings are still being dumped in the lake, it is encouraging to know that some of the dredgings from the Calumet River are being disposed of on land. By next year we expect to have a report on the studies now being conducted to find alternate disposal methods for the entire Great Lakes.

Our agency has been involved in surveillance of the area, and a report of water quality conditions will be presented. This is the third such report since the first session of the conference in March 1965, and I can tell you now that we are not able to present a rosy picture.

H. W. Poston

Since our last meeting, we have been involved in another area of pollution that was so enormous that the entire country knew about it. That was the massive die-off of alewives. When the die-off began, we immediately investigated conditions in the southern half of the lake and found no evidence that pollution caused the die-off. Tests were made for water quality characteristics such as pesticides, toxic metals and other substances that are usually implicated in a fish kill. As you know, the billions of dead fish restricted recreational uses and increased the cost of water treatment; and for those reasons, the dead fish were considered pollutants. Above all, the odor they gave off was more than anyone could bear. High-level concern for this is evidenced by the fact that Secretary Udall organized a task force in the Department of the Interior to combat the problem. The task force is headed up by Assistant Secretary Stanley A. Cain. Although the Bureau of Commercial Fisheries is the principal agency involved in the alewife problem, the Federal Water Pollution Control Administration will continue to work closely with them to bring about some kind of relief.

Another problem that followed on the heels of the massive alewife mortalities was the algal growth cladophora. These green plant masses were scattered through the water so swimmers became draped with green slime, and it washed up on the beaches in stinking windrows. The Chicago beaches suffered moderately, but pileups of cladophora in southwest Michigan and in Indiana have been the worst ever. This is a most serious problem, not only because of the nuisance it causes, but because it is a positive indicator of over-fertilization.

At this time, I would like to call on Colonel Warner of the Fifth Army to make a statement to this group.

MR. STEIN: Would all those other than the panel members making a statement, come to the lectern and identify themselves for the record before making their statement? Thank you.

Colonel Warner.

STATEMENT OF COLONEL E. B. WARNER, CHIEF, ENGINEER DIVISION, HEADQUARTERS FIFTH UNITED STATES ARMY

COLONEL WARNER: Members of the Conference on Pollution of the Interstate Waters of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan and its Tributaries:

Col. E. B. Warner

I am Colonel E. B. Warner, Chief, Engineer Division, Headquarters Fifth United States Army. I represent Lt. General John H. Michaelis, Commanding General, Headquarters Fifth United States Army, and will provide a status report on the pollution sources within the jurisdiction of Headquarters Fifth United States Army that are of interest to the conferees. These pollution sources consist of the discharges from four small NIKE sites located wholly within the State of Indiana. Their specific locations have previously been made part of the record of this conference.

Responsibility for operation and maintenance of the sewage treatment facilities at these NIKE sites is delegated to the Post Engineer, Fort Sheridan, Illinois, and that office has previously provided the conferees with periodic status reports on an "as requested" basis. The most recent report was furnished the Federal Water Pollution Control Administration on March 13, 1967, and was read into the record of this conference on March 18, 1967.

That report stated the difficulties that had been experienced in reconstructing the sand filter at NIKE Site C-45, Gary, Indiana, but stated that operation would be achieved in April 1967. This objective was met. It should be noted that the chlorination facilities had been available for use since the previous September.

The report also stated that chlorine contact tanks and chlorination facilities would be installed at NIKE Site C-32, Porter, Indiana, NIKE Site C-46, Munster, Indiana, and NIKE Site C-47, Wheeler, Indiana, with bid to be requested in May 1967 and construction to be accomplished in June 1967. Requests for bids were, in fact, issued on April 11, 1967, but no bidders responded. As a result, Fort Sheridan undertook a canvassing operation to generate bid interest in the project. Invitations for bid were reissued on May 19, 1967, and one bid for $16,905 was received. This headquarters considered the single bid to be excessive since the only work involved was installation of a 750-gallon pre-cast chlorine contact tank and a chlorine drip-feeder controlled by an electrically operated solonoid valve. However, since other delays beyond this headquarters control had occurred, as already indicated, and since Fort Sheridan had made a commitment to the conferees, this headquarters approved award of contract 5641 on June 29, 1967. Installation of the required chlorination facilities is proceeding as scheduled. The chlorine contact chambers have already been installed, the drip feeding equipment has been installed, and necessary electrical and plumbing connections are nearing completion. The scheduled completion date is September 19, 1967, and this headquarters has been advised that the contract will be completed by the scheduled date.

The status report of March 13, 1967, also stated that routine testing of the performance of these sewage treatment plants would be accomplished upon completion of the chlorination systems.

Periodic laboratory testing has already been accomplished; however, routine laboratory testing has presented serious logistical problems. The only military laboratory facility available to the NIKE sites is the one located at the Fort Sheridan Sewage Treatment Plant. The location of the sites relative to Fort Sheridan makes it necessary to hand-carry collected samples to Fort Sheridan for testing. This approach is costly, time-consuming and impractical. Fort Sheridan has been unsuccessful to date in making arrangements with a local sewage treatment plant to perform the necessary testing on a fee basis. Negotiations are currently under way with Gary, Indiana, and a decision is anticipated on September 13, 1967. If these local type arrangements are not possible, this headquarters will be unable to perform the more meaningful biochemical oxygen demand test and will initiate the relative stability test on the final effluent.

Equipment for settleable solids and chlorine residual testing is being ordered to coincide with the operation of the completed chlorination facilities. These tests will be performed by the water and sewerage man assigned to the four sites and he will also be instructed in the performance of the relative stability test if this latter test becomes necessary.

This headquarters concludes that it has followed the schedule contained in the last status report except for delay due to circumstances beyond its control.

MR. STEIN: Thank you, Colonel Warner.

Are there any comments or questions?

(No response.)

MR. STEIN: That is a very encouraging report indeed.

As Mr. Poole and Mr. Klassen and the others with whom I have worked over the years know, there is only one way to get at pollution control in an area, and that is you have got to get at every source no matter how large or how small. There is no cut-off. We have been through this many, many times.

We recognize that while pollution control from the NIKE sites is relatively small, in any event, I think the Fifth Army is to be commended for taking such action, because they are a Federal agency and a sister Federal agency, and our mandate is to show the way, if we can, to take such action and do this.

This report is encouraging indeed.

If I understand this, this means that all Federal installations in the area have adequate waste treatment facilities. Is that correct?

MR. POSTON: That is correct.

MR. STEIN: Thank you very much.

Mr. Poston?

MR. POSTON: I would like to call on Mr. Robert Bowden, who is our Engineer in Charge of Surveillance Activities, to make the presentation on his surveillance activities.

Mr. Bowden.

STATEMENT OF ROBERT J. BOWDEN, DIRECTOR OF THE CALUMET AREA SURVEILLANCE PROJECT, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, DEPARTMENT OF THE INTERIOR, CHICAGO, ILLINOIS

MR. BOWDEN: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am Robert J. Bowden, Director of the Calumet Area

Surveillance Project. This project was organized at the request of the States of Illinois and Indiana, in order to assist them in the monitoring of the Calumet Area. Its basic function is to determine the quality and changes in quality of the various waters of the enforcement area and to report to the States and to the conferees so that they may evaluate the progress that has been made.

Today I am presenting a report on the water quality in the area which covers the period January to June 1967 and includes a section on the beaches which is updated to include July 1967. I would like to have this report entered into the record in its entirety.

Gentlemen, the report has just come off the presses, and I would like to distribute them to the conferees now.

MR. STEIN: Let me see the report.

MR. BOWDEN: There are copies available out on the table in the hall, if anybody would like to have them.

MR. STEIN: Without objection, this report will be entered into the record as if read.

By the way, the transcript of the conference is being made by Mr. Al Zimmer, who is a contract reporter with the Federal Government, and he received the job on a low bid basis.

R. J. Bowden

We will print the entire proceedings, and distribute them, but they may not be available for about four months. If any of you should desire to get a transcript beforehand, you may feel free to deal directly with Mr. Zimmer. I expect that Mr. Zimmer will charge you as reasonable a fee as he charges us.

(The following is the report submitted by Mr. Bowden:)

R. J. Bowden

REPORT ON THE WATER QUALITY OF LOWER LAKE MICHIGAN, CALUMET RIVER, GRAND CALUMET RIVER, LITTLE CALUMET RIVER AND WOLF LAKE

By

DEPARTMENT OF THE INTERIOR

FOR THE PERIOD

JANUARY 1967 THRU JUNE 1967

ILLINOIS - INDIANA

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION, CHICAGO, ILLINOIS
August 1967

* * *

STATUS REPORT ON THE CALUMET AREA POST ACTION SURVEILLANCE PROJECT

DEPARTMENT OF THE INTERIOR

FOR THE PERIOD

JANUARY THROUGH JUNE 1967

R. J. Bowden

ILLINOIS - INDIANA

U. S. Department of the Interior
Federal Water Pollution Control Administration
Great Lakes Region
Chicago Program Office

August 1967

* * *

INTRODUCTION

This report on the changes in water quality in the Calumet Area is the fourth in a series of semi-annual reports made by the Calumet Area Surveillance Project of the Federal Water Pollution Control Administration (FWPCA). Previous reports covered the periods July to December 1965, January to June 1966 and July to December 1966. This report covers January to June 1967 and includes a section on the beach surveillance program which covers data collected during July 1967.

The waters reported on include the Grand Calumet River, the Indiana Harbor Canal, Indiana Harbor, the Little Calumet River, Wolf Lake, Wolf Lake Outlet, Calumet Harbor and the lower end of Lake Michigan. Beaches include Rainbow Beach, two Calumet Park Beaches, Hammond Beach, Whiting Beach, East Chicago Beach and the Hammond Beach on Wolf Lake.

The cooperation provided by the Indiana Stream Pollution Control Board, the Illinois Sanitary Water Board, the Metropolitan Sanitary District of Greater Chicago, the United States Coast Guard, U. S. Army Corps of Engineers and others in supplying valuable information and facilities is gratefully acknowledged.

FWPCA personnel who participated include:

Robert J. Bowden, Director
Anne Byrne, Microbiologist
Joseph V. Slovick, Sampler-Hydraulics Technician
William J. Degutis, Sampler-Monitor Technician
Daniel Chorowicki, Aquatic Sampler
Lillian Ehlert, Secretary

BACKGROUND

Authority and Organization

A conference on pollution of the interstate waters of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan and their tributaries, called by the Secretary of Health, Education, and Welfare under the provisions of Section 8 of the Federal Water Pollution Control Act (33 USC 466 et. seq.) was held in Chicago, Illinois, March 2-9, 1965.

Paragraph No. 14 of the Conclusions and Recommendations of the conferees for this conference provided that "Surveillance will be the primary responsibility of the Indiana Stream Pollution Control Board, the Illinois Sanitary Water Board and the Metropolitan Sanitary District of Greater Chicago. The Department of Health, Education and Welfare will make available a resident technical group and visiting groups of experts which will assist the State agencies and the Metropolitan Sanitary District of Greater Chicago at such time as requested by them."

The State of Indiana, on April 6, 1965, and the State of Illinois, on April 16, 1965, requested an extensive sampling program by the Federal Government to monitor the water quality in the Calumet Area. The Metropolitan Sanitary District has not formally requested a sampling program, but has requested laboratory assistance in the analysis of samples they have collected and in special studies they have conducted on chlorination of the effluent from their sewage treatment plant. The Calumet Area Surveillance Project was organized in the latter part of June 1965 to fulfill the requirements of paragraph No. 14 and the requests of the States.

On January 1, 1966, the Federal Water Pollution Control Administration was created within the Department of Health, Education, and Welfare and incorporated the surveillance project.

On May 10, 1966, the Federal Water Pollution Control Administration was transferred from the Department of Health, Education, and Welfare to the U. S. Department of the Interior.

Purpose and Scope

The purpose of the Calumet Area Surveillance Project is to assess the progress in the abatement of pollution in the conference area in cooperation with appropriate State and local agencies. This is being accomplished through a sampling program to monitor the water quality at various locations within the conference area and a series of electronic water quality monitors to continuously monitor the water quality at selected key points in the basin. Streamflow measurements are being made so that laboratory analyses in milligrams per liter can be converted to pounds per day. The information obtained through Federal, State and local sampling programs and the information furnished by the industries to the State or other responsible agencies on the quality and quantity of their waste flows are evaluated.

Reports are prepared and presented to the conferees and reconvened conferences on the current water quality and the progress toward abatement of the pollution.

Criteria

The conclusions drawn in this report regarding water quality conditions in the Calumet Area are made relative to certain specific water quality standards. These standards, which are referred to throughout the report, are those proposed by the State of Indiana and approved by the Secretary of the Interior on July 18, 1967.

DESCRIPTION OF AREA

The Calumet area is a flat plain located at the southern end of Lake Michigan and includes the Calumet-Little Calumet River system, the Grand Calumet-Indiana Harbor Canal system, Wolf Lake and its outlet. It includes approximately 742 square miles and forms a part of the continental divide between the Mississippi River Basin and the Great Lakes-St. Lawrence River Basin. Approximately 60% of the area drains to Lake Michigan and the remaining

40% drains to the Mississippi River by way of the Illinois River system. Despite this fact the area is not well drained. There are large, marshy, low-lying areas which are subject to flooding during and after heavy rainfalls. The streams are sluggish and meandering except where they have been artificially maintained and/or supplemented by industrial or municipal waste flows.

The Grand Calumet and the Little Calumet Rivers both traverse the divide. On the Grand Calumet the divide is normally located at the Hammond, Indiana, Sewage Treatment Plant outfall. Approximately two-thirds of the effluent flows west into the Calumet River in Illinois and one-third flows east to the Indiana Harbor Canal and Lake Michigan. Rainfall and lake level conditions can cause the divide to shift to either the east of the west.

The location of the divide on the Little Calumet River is not definite and varies over a distance of several miles in the vicinity of Highland, Indiana. The western portion flows to the Cal-Sag Channel in Illinois, which connects the system to the Illinois River. The eastern portion flows to Lake Michigan by way of Burns Ditch, which discharges to the lake near Ogden Dunes, Indiana.

Flow in the Calumet River is controlled by the O'Brien Lock and is directed from Lake Michigan to the

Cal-Sag Channel except during periods of heavy flooding or unusually low lake levels.

The Indiana Harbor Canal connects the Grand Calumet River to Lake Michigan. The Grand Calumet River east of the Hammond Sewage Treatment Plant outfall is tributary to Lake Michigan through the canal.

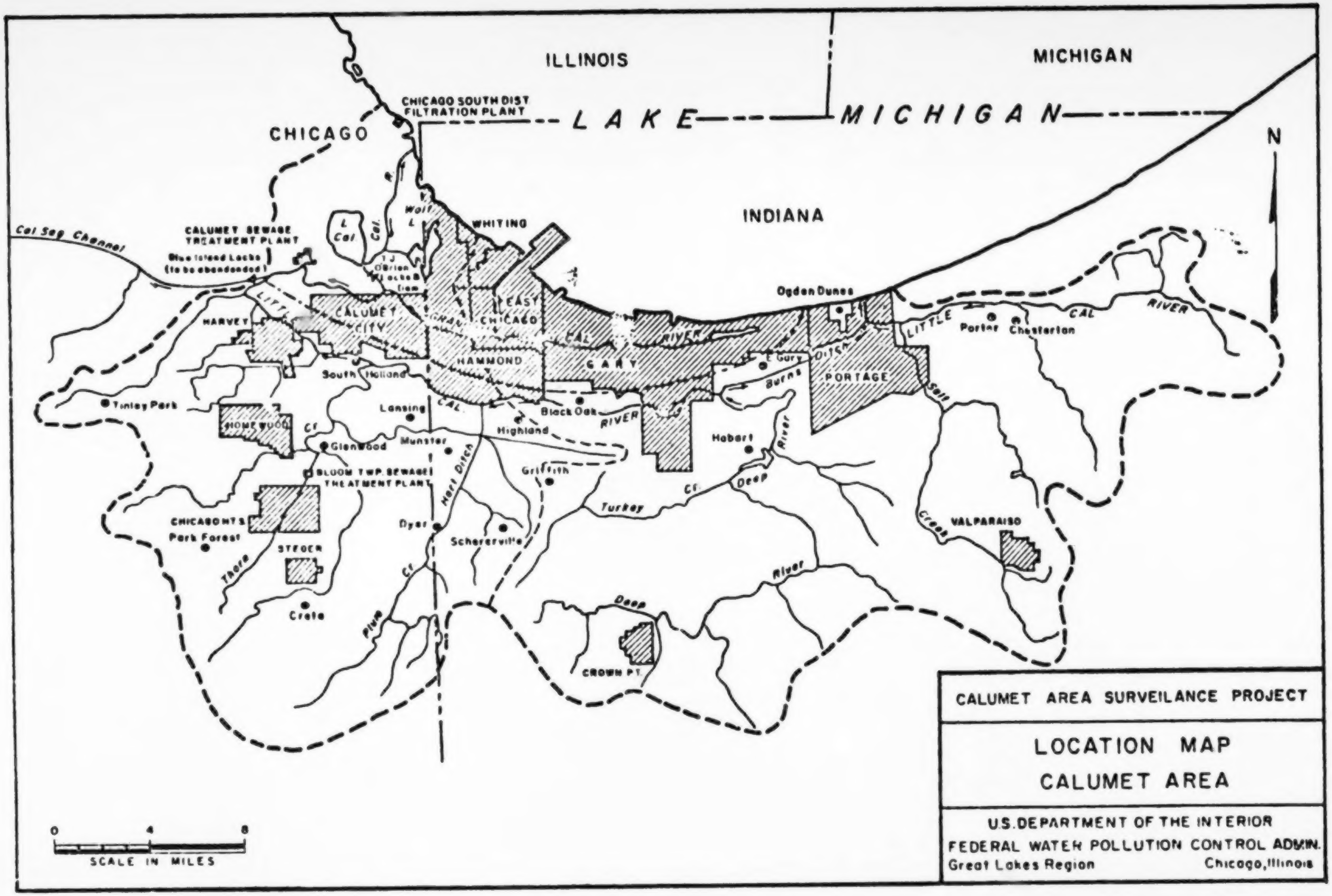
Wolf Lake is located on the Illinois- Indiana State line between Chicago, Illinois, and Hammond, Indiana. The original outlet from Wolf Lake to Lake Michigan has been blocked and an outlet to the Calumet River in Chicago has been constructed. The City of Hammond maintains a park which occupies most of the Indiana shoreline of the lake. This park and the lake are extensively used for recreation. The Illinois portion of the lake is a part of the Wolf Lake Conservation Area.

Cities and Industries

The major population centers in the area are East Chicago, Gary, Hammond and Whiting in Indiana; and Calumet City, Chicago Heights and a part of the south side of Chicago in Illinois. The area is highly industrialized. There are ten major steel mills including the United States Steel Corporation's Gary Works, Gary Sheet and Tin Mill, Youngstown Sheet and Tube Company, and Inland Steel

Company in Indiana; and United States Steel's South Works, the Wisconsin Steel Company, the Interlake Iron Corporation, the Republic Steel Corporation and the Acme Steel Company in Illinois. There are five petroleum refineries including the American Oil Company, the Cities Service Petroleum Company, the Mobil Oil Company, and the Sinclair Refining Company in Indiana; and the Clark Oil and Refining Company in Illinois. Other industries include Lever Brothers, Union Carbide Chemical, E. I. DuPont, M & T. Chemicals, American Maize and a large number of smaller concerns.

These industries are located in three major groups. One group is concentrated along the Calumet River in Illinois. Another is along the Indiana Harbor Canal; and the third is in Gary, Indiana, and discharges to the headwaters of the Grand Calumet River. These three groups make the Calumet Area one of the most important industrial centers in the Nation and also one of the most significant from the standpoint of water pollution.



CALUMET AREA SURVEILANCE PROJECT

LOCATION MAP
CALUMET AREA

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region
Chicago, Illinois

DESCRIPTION OF PROGRAMS

Stream and Harbor Sampling Programs

Seventeen stream, harbor and water intake stations were scheduled to be sampled on a weekly basis to determine chemical and microbiological quality during the period January to June 1967. Thirteen of these were sampled during the entire period. The remaining four are lake stations that required a boat for sampling, and were not sampled before May 5, 1967, due to ice and inclement weather on the lake. The results of this sampling program are the basis for this report. The sampling locations are indicated on maps dispersed throughout this report, preceding the discussion of the results for each station.

Beach Sampling Program

Sampling on seven beaches in the area was initiated on May 16, 1967, and will continue on a twice weekly basis until September 15, 1967. Six of these beaches are located on Lake Michigan and one on Wolf Lake. A map showing the location of these beaches is on page 10. Five of the beaches were sampled at their mid-points in water approximately three feet deep. Rainbow Beach and Calumet Inner Beach were each sampled at two locations. Samples were collected on Tuesday and Thursday of each week and analyzed for total coliforms, fecal coliforms and fecal streptococci. This program was coordinated with the beach sampling programs of the Chicago Park District and the Indiana State Board of Health and data was distributed freely among the agencies.

Automatic Monitoring Program

Many operations of the industries in the basin result in discharge of wastes on a batch basis. This may occur at various times, depending on the operations of the industry. These discharges and accidental spills of oil or other pollutants could pass into Lake Michigan or down the Illinois River unobserved by a once-a-week sampling program. As the general quality of the waters in the area improves, these spills will become more significant. Such spills will be detrimental to water uses which otherwise would be supported by the improved water quality.

A system of 24-hour automatic water quality monitors is being established in the area to detect such spills. Two of these instruments are in place and four more will be installed before the spring of 1968. A centralized computer station for the efficient handling of data from these instruments has been proposed to make the system an on-time system with a short reaction time. An on-time system is a system capable of detecting and reacting to pollution as soon as it occurs.

Biological Sampling Program

The kinds and number of aquatic plants and animals inhabiting a particular body of water reflect the quality of the water that prevails in the area. Those that inhabit the bottom reflect the quality that existed in the past. Some organisms are capable of withstanding polluted conditions and will multiply rapidly when competition from other less tolerant organisms is eliminated. These pollution tolerant organisms include sludgeworms, bloodworms, leaches, blue green algae and pulmonate snails. In an unpolluted environment the number of these organisms is restricted by competition from other species but when the other species are killed off by pollution they multiply rapidly. Therefore, the continuous or sudden introduction of toxic wastes, settleable solids or oxygen consuming materials alters the composition of the benthic population. A balanced benthic population is not restored immediately upon the return of optimum water quality because the lengths of the life cycles of these organisms vary from weeks to years. This fact makes it possible to detect slugs of pollution that have passed through a sampling station.

In order to develop a more uniform and reliable biological sampling technique, an experimental program using artificial substrates has been established. During April 1967 five Dendy type samplers were placed in streams of various quality in the Calumet Area. Regular bottom samples using a Peterson dredge were collected when the Dendy samplers were retrieved. A report on the results of this program is included in this report.

CONCLUSIONS

1. Industrial pollution in the Grand Calumet River-Indiana Harbor Canal System has become more severe since 1965. The findings indicate that concentrations of iron, cyanide and phenolic compounds were all higher than in 1965.

2. Bacterial quality in the Grand Calumet River-Indiana Harbor Canal System is still unsatisfactory.

3. Floating oil was consistently reported at all stations on the Grand Calumet River-Indiana Harbor Canal System.

4. The water quality in the western portion of

the Grand Calumet River at the State line improved slightly during the summer of 1966, but deteriorated during the winter due to an increased amount of raw or inadequately treated sewage reaching the stream. The stream did not meet the standards at any time.

5. Overflow from combined sewers associated with heavy rainfalls during April and May of 1967 caused a significant increase in bacterial counts at all stations.

6. The water quality in the Little Calumet River has improved since 1965, but the stream is still subject to severe pollution from combined sewer overflows and does not meet the standards.

7. Wolf Lake is a high quality body of water, suitable for all water uses but is threatened by high nutrient concentrations. Except for nutrients there was substantial compliance with the standards.

8. The water quality at the East Chicago and Hammond water intakes meets some of the standards but is affected by wastes from Indiana Harbor and direct discharges to the lake, causing violation of the standards for ammonia, total phosphates, iron, phenol and threshold odors.

9. The water quality at Chicago's Dunne Crib and the Gary water intake did not meet the standards for chlorides, ammonia, total phosphate, iron, phenol and

threshold odor.

10. The water quality at Chicago beaches was satisfactory except during early July and during periods of easterly winds when such winds locked in the contamination that might otherwise have been carried away.

11. Oil and grease was consistently found in samples from all of the water intakes.

12. The large number of alewives that died and were washed onto the beaches caused a severe odor and esthetic problem, but did not cause immediate increases in the bacterial counts. Decaying fish may have caused the increased counts during July.

13. The water quality at Indiana beaches was not satisfactory, due to wastes from Indiana Harbor and direct discharges to Lake Michigan.

Recommendations to the Conferees

1. That numerical criteria for total iron, cyanide, sulphate and oil be included in the standards adopted for the Grand Calumet River.

2. That the criteria for ammonia in open Lake Michigan waters be reviewed in light of the high levels routinely found in the lake and the recommendations in the Laboratory Committee's report on ammonia.

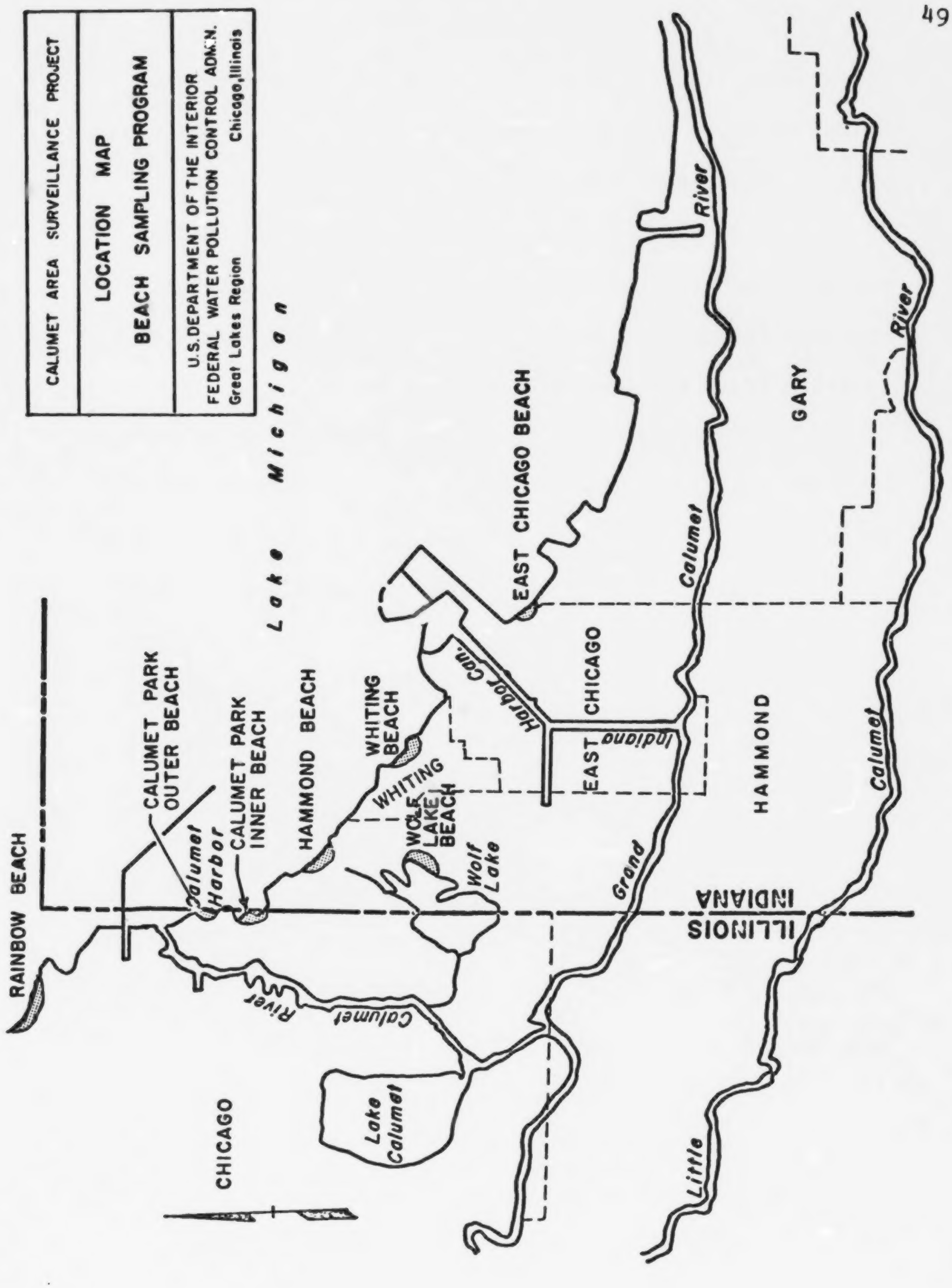
3. That the criteria for MBAS be reviewed in light of the limitations of the laboratory analytical procedure reported in Standard Methods.

WATER QUALITY

Beach Sampling Program

Six Lake Michigan beaches in the Calumet Area are being sampled twice each week for bacterial quality during the 1967 bathing season. This program, which started on May 18, 1967, and will continue until September 15, 1967, includes Rainbow Beach, Calumet Park Inner Beach, Calumet Park Outer Beach, Hammond Beach, Whiting Beach and East Chicago Beach. Rainbow Beach and Calumet Park Inner Beach are each sampled at two points. In addition, the Hammond Beach on Wolf Lake is being sampled.

Samples are obtained in four feet of water at elbow depth by samplers who wade into the lake wearing rubber waders. The purpose of the rubber waders is to prevent contamination of the sample by the sampler. The samples are immediately stored on ice and are processed by the laboratory within a few hours of collection. Samplers record the following information at the time of collecting the sample: number of bathers within 100 feet, air



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

BEACH SAMPLING PROGRAM

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADM.N.
Great Lakes Region
Chicago, Illinois

temperature, water temperature, wind speed and direction, height of waves, cloud and weather conditions and any other factors that may affect water quality.

Samples collected by the Surveillance Project are processed in the Chicago Program Office by means of the membrane filter (MR) method to determine total coliform, fecal coliform and fecal streptococci.

The laboratory methods followed are in accordance with the procedure established in "Standard Methods for the Examination of Water and Wastewater" (12th ed). Fecal coliform determinations are made by the MF method, using M-FC broth base (Difco) with Rosolic acid as an indicator. This method was developed by [1]Geldreich et al at the Robert A. Taft Sanitary Engineering Center in Cincinnate, Ohio.

The criteria for determining satisfactory water quality for bathing at the Calumet Area beaches are the following:

a. The water quality is satisfactory if MF coliforms are less than 1000 and MF fecal streptococci are less than 100 per 100 milliliter (ml) of sample.

b. The water quality is satisfactory if MF coliforms are between 1000 and 5000 and MF fecal streptococci are less than 20 per 100 ml of sample.

An average of the five most recent counts is

[1] Geldreich et al '65, J.A.W.W.A., 57:2:208-214, Feb.

used to determine if the water quality is satisfactory.

Results

This report considers the results of the beach sampling program up to the end of July 1967. The next semi-annual report will consider the entire 1967 swimming season.

Table B-1 and Figures B-1, B-2 and B-3 on pages 12 through 15 compare the beaches during the period May 18, 1967, to July 27, 1967, with a similar period in 1966. Table B-1 indicates no significant change in the water quality at the beaches. There are two exceptions; the Calumet Park Outer Beach met the criteria more often in 1967; on the other hand, East Chicago Beach did not meet the criteria as often as in 1966. Rainbow Beach and the two Calumet Park beaches met the criteria until the beginning of July, when several very high counts were made. During this period there were a large number of partially decomposed alewives on the beaches and in the water. It has been considered a possibility that the high coliform counts during July may have been related to the decomposing fish; however, studies directed at confirming this fact have thus far been inconclusive. During the last week of July the alewives disappeared. At this time the coliform counts returned to a level which meets the criteria.

R. J. Bowden

The correlation between winds with an easterly component and the high counts which was noted in 1966 continued in 1967. In addition, the easterly winds lock in contamination that might otherwise be carried away from the beaches.

Hammond Beach, Whiting Beach and East Chicago Beach are still heavily polluted. This is due to the combined sewer overflows that discharge in the area and the beaches' proximity to the mouth of the heavily polluted Indiana Harbor. Wolf Lake continued to meet the criteria during the first half of the 1967 bathing season.

TABLE B-1
BEACH SAMPLING RESULTS

	1966 May 31-July 28			1967 May 18-July 27		
	No.of Samples	No.of Failures	% of Failures	No.of Samples	No.of Failures	% of Failures
Rainbow-75th	18	7	39	20	7	35
Rainbow-77th	18	8	44	20	8	40
Calumet Outer	18	14	78	20	5	25
Calumet Inner-99th	18	10	56	20	9	45
Calumet Inner-100th	18	12	67	20	10	50
Hammond	18	17	94	20	18	90
Whiting	18	18	100	20	14	70
E. Chicago	18	10	56	20	16	80
Wolf Lake	18	0	0	20	0	0

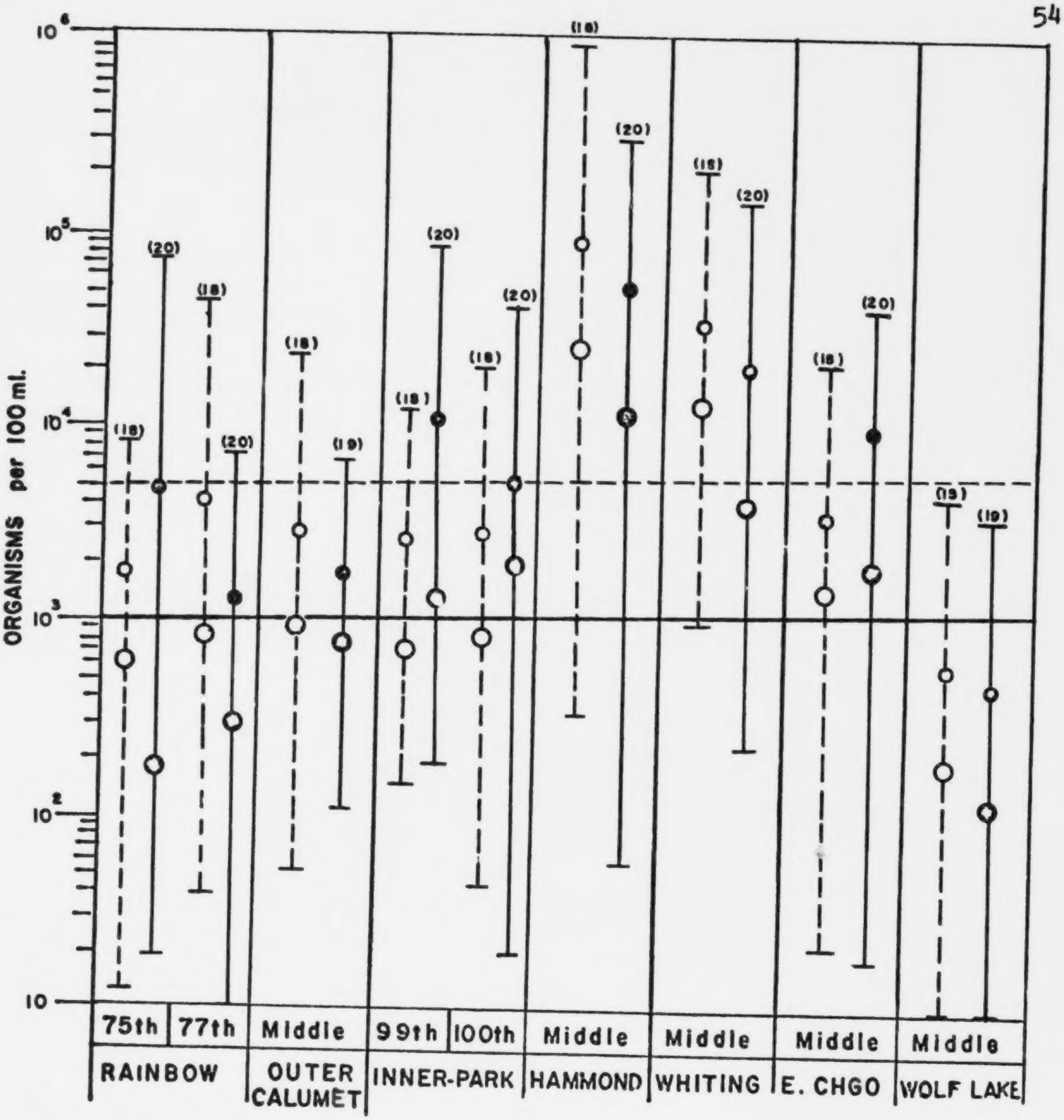


FIGURE B-1

CALUMET AREA SURVEILLANCE PROJECT

BEACH SAMPLING RESULTS
Total Coliforms
1966 and 1967

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

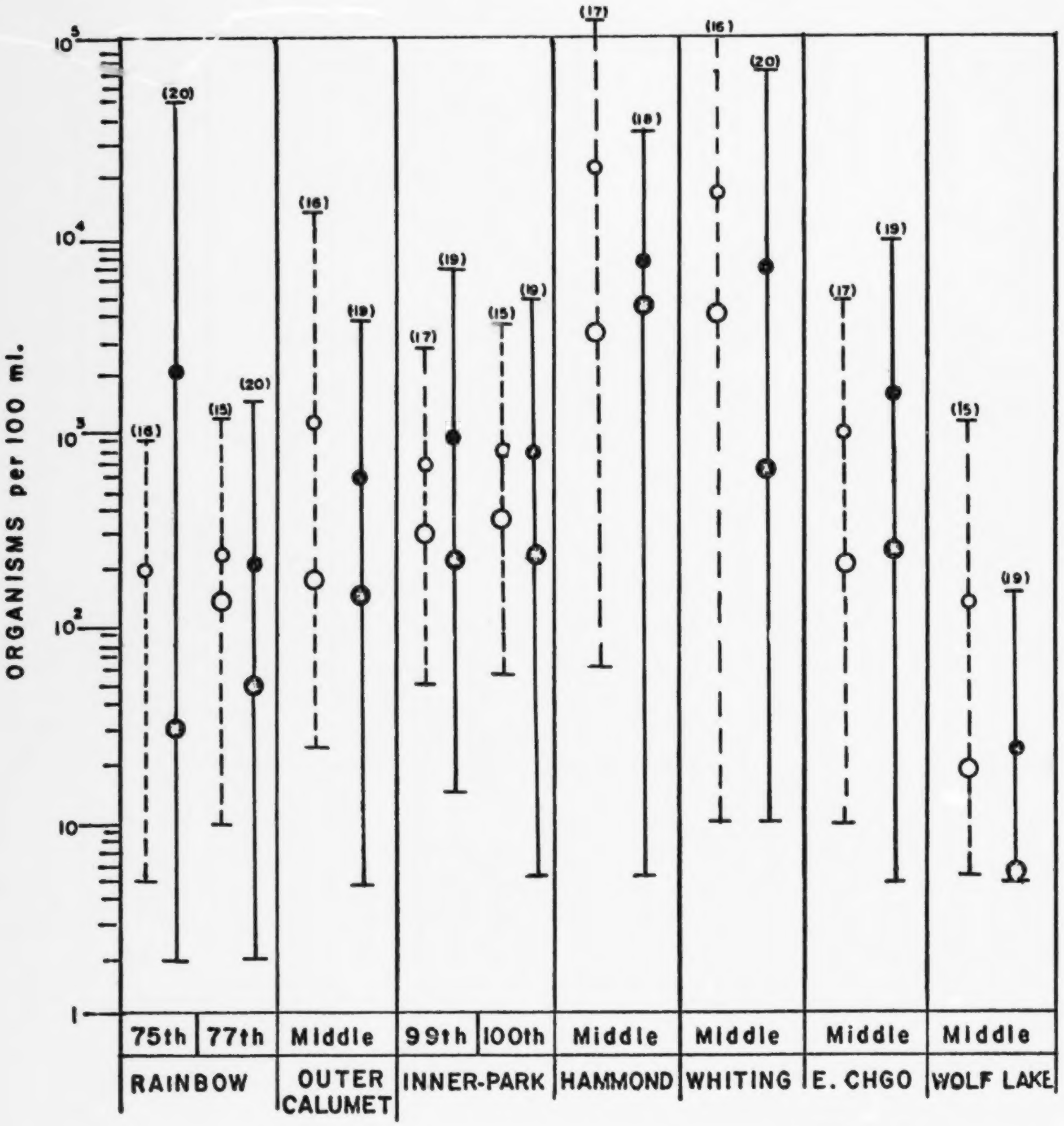


FIGURE B-2

CALUMET AREA SURVEILLANCE PROJECT

BEACH SAMPLING RESULTS
Fecal Coliforms
1966 and 1967

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

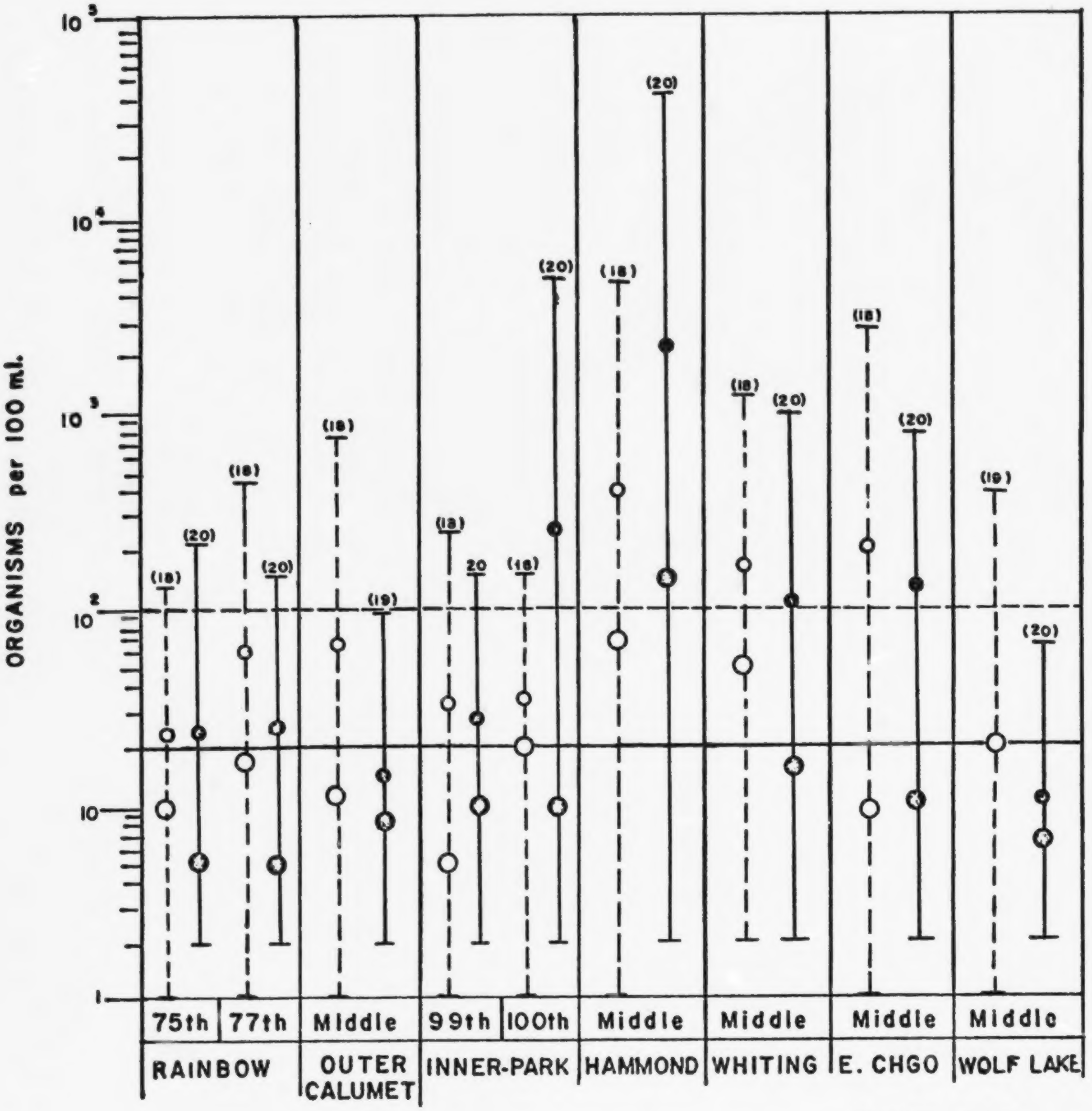


FIGURE B-3

CALUMET AREA SURVEILLANCE PROJECT

BEACH SAMPLING RESULTS
Fecal Streptococci
1966 and 1967

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

Stream, Harbor and Water Intake Sampling

Thirteen stream and harbor stations and four Lake Michigan water intakes were scheduled to be sampled for bacterial and chemical quality during the first six months of 1967. Samples were collected once each week except that stations requiring a boat could not be sampled during severe weather. All stream stations were sampled at midstream except for the monitor stations, Numbers 6 and 11, which were sampled at the water quality monitor intake. The samples for bacterial analyses were taken at a depth of one foot. The samples for chemical analyses were taken at mid-depth or 10 feet in the case of navigable channels. All water intake samples were taken from the raw water tap at each of the water fitlration plants.

All samples were immediately preserved and/or iced where required in accordance with procedures established in "Standard Methods for Examination of Water and Wastewater, 12th Edition, 1965." Laboratory analyses on samples subject to deterioration were initiated on the day they were collected.

Bacterial analyses were performed as described on page 11.

Chemical analyses were performed in accordance with methods agreed upon by the Calumet Area Enforcement

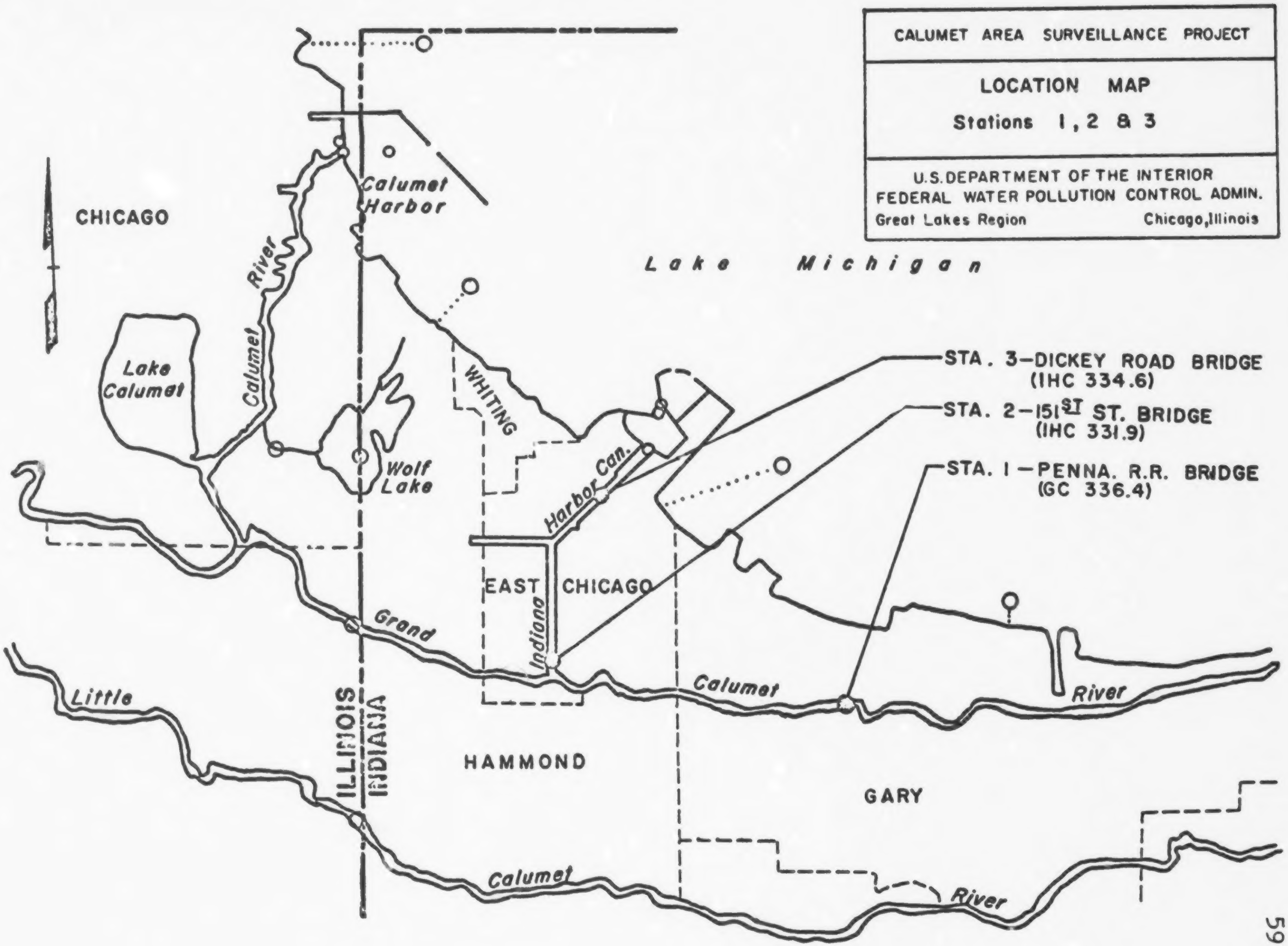
Laboratory Directors Committee.

In the following discussion criteria have been applied to some stations for which they were not specifically designated in the Water Quality Standards previously referred to. This was done for data evaluation purposes only. Where stations were not designated as control points and had no specific criteria established the most applicable and reasonable criteria were used.

Station 1 - Grand Calumet River at the Pennsylvania R.R. Bridge

This station is located approximately two miles downstream from the United States Steel Company's complex at Gary, Indiana. The bulk of the flow is industrial waste from this complex with some combined sewer overflows from the City of Gary, Indiana.

Figure 1 on page 19 shows that the improvement in the bacterial quality of the stream still does not meet the criteria. April and May of 1967 were unusually wet months in the Calumet Area and caused increased discharges of stormwater overflows from the City of Gary which resulted in higher counts during these months. It appears that the goals set by the State of Indiana cannot be reached until a solution is found for the problem of combined sewer overflows.



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

Stations 1, 2 & 3

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region
Chicago, Illinois

R. J. Bowden

The industrial waste problem at this station continued to grow more severe. Figures 2 and 3 on pages 20 and 21 and Table 1 on page 22 show increased amounts of iron, phenols and cyanide in the stream. All of these are constituents of steel mill wastes. Sulphates have not decreased since the beginning of the surveillance in 1965. Occasional high concentrations of sulphate accompanied by a low pH indicate the presence of spent pickling liquor. The latest detected incident of this occurred on March 5, 1967. This indicated that the deep well was not in satisfactory operation at that time.

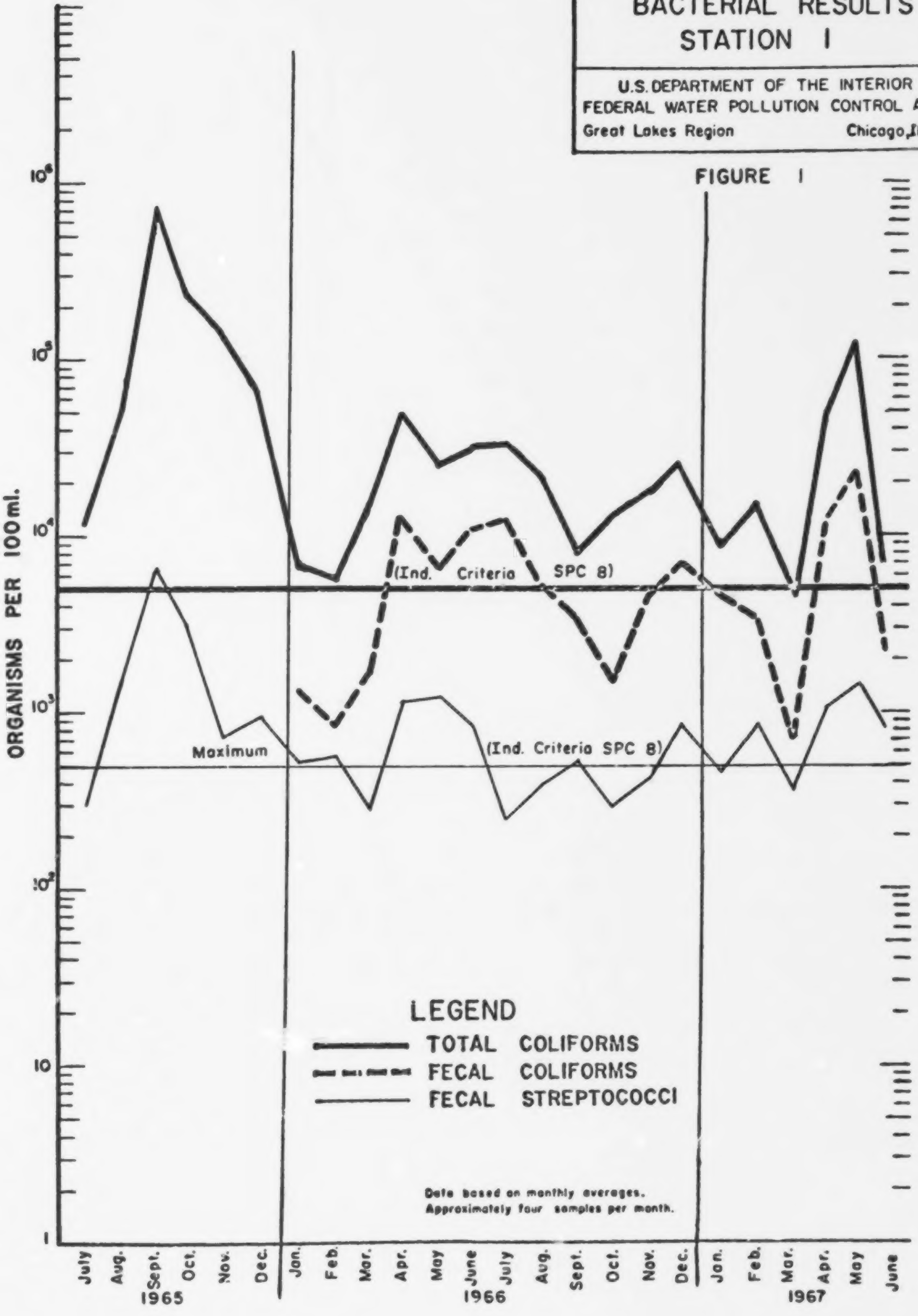
The continued discharge of industrial wastes to the stream caused a considerable amount of sedimentation. During May and June of 1967 this sedimentation raised the level of the river to a point where it reportedly overtopped the outer weirs of the bypass structures on the Gary's combined interceptor sewers. This reportedly resulted in excessive pumping by the city of Gary and threatened to cause serious flooding at the sewage treatment plant and in the city. The steel company subsequently dredged a large amount of material from the river and pumped it to storage lagoons, lowering the river by six inches to one foot, thereby temporarily relieving the problem.

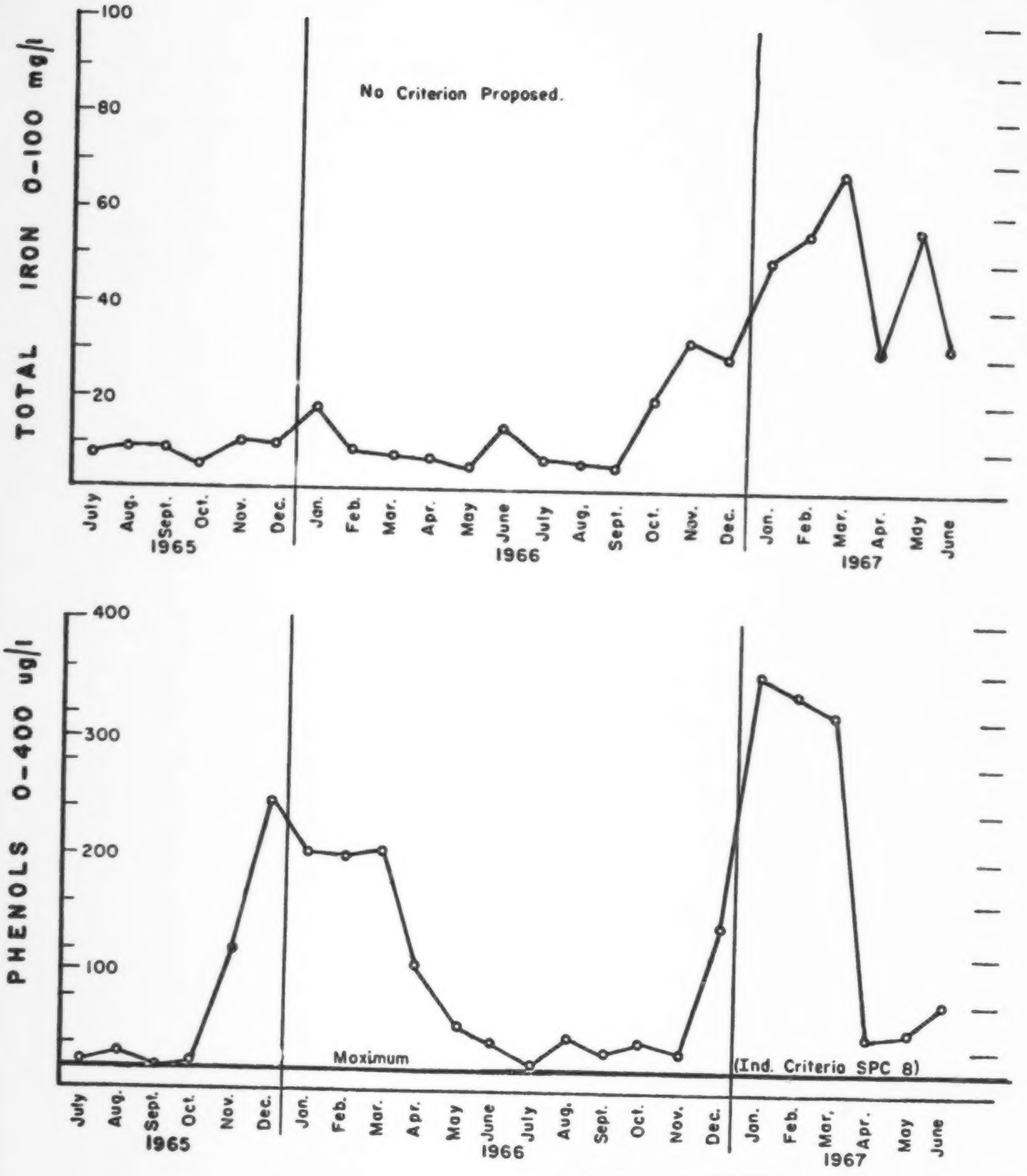
CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 1

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 1





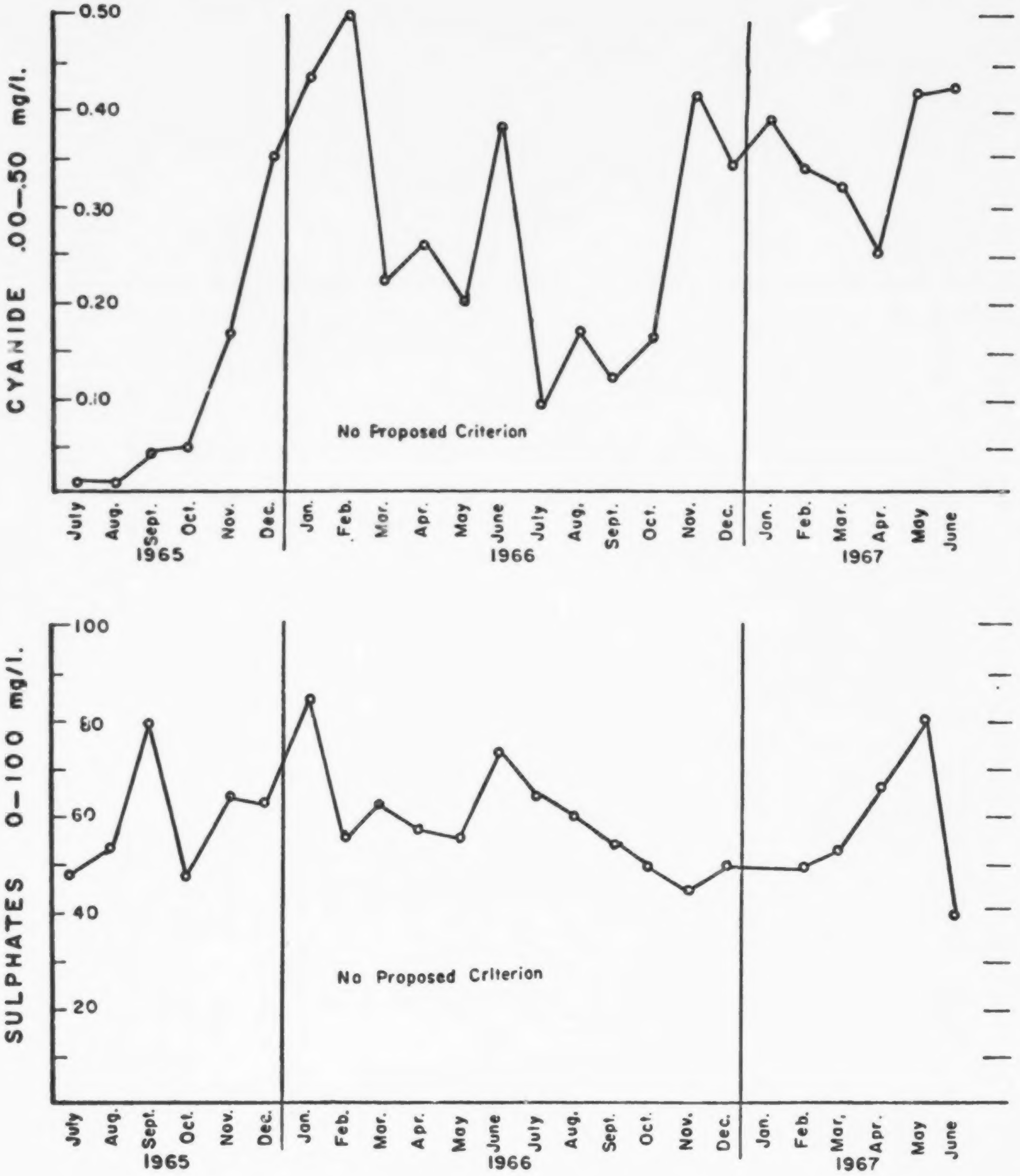
Data based on monthly averages.
Approximately four samples per month.

FIGURE 2

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION I
Grand Calumet River at
Pennsylvania R.R. Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois



Data based on monthly averages.
Approximately four samples per month.

FIGURE 3

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION I
Grand Calumet River at
Pennsylvania R.R. Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

TABLE 1

CHEMICAL QUALITY OF WATER
STATION 1 - GRAND CALUMET RIVER AT PENNSYLVANIA R.R. BRIDGE-GC 336.6

Parameter		July 65 - June 66				July 66 - June 67				Standards Adopted by Ind. for Grand Calumet R. (Spc 8)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	29	10	19	18	32	9	19	19	32.3	-	-
pH		8.0	3.6	-	6.9	7.2	6.1	-	6.8		(med.)	6.5-9.0
Conductivity	umho/cm	765	308	399	380	580	330	391	385			
Alkalinity	mg/l	-	-	-	-	127	36	97	100			
DO	"	9.00	1.10	5.22	5.0	8.85	1.40	5.24	5.45	-	1.0	3.0 (May-Sept)
BOD	"	17.0	2.4	9.3	8.5	15.0	3.0	8.4	8.8	10	--	-
COD	"	152	8	35	29	114	14	42	39			
Sulphates	"	200	32	63	53	170	28	54	50			
Chlorides	"	40	14	20	18	41	10	19	19	125	-	75
MBAS	"	0.28	0.07	0.14	0.12	0.34	0.08	0.15	0.15	0.5		
NH_3-N	"	4.40	0.87	1.97	1.7	4.20	0.09	1.89	1.7	5.0	-	-
NO_2+NO_3-N	"	11.30	0.18	0.89	0.60	12.00	0.09	0.47	0.43			
Org.N	"	3.71	0.0	0.94	0.50	1.4	0.0	0.06	0.05			
Sol PO_4	"	0.41	0.00	0.15	0.12	0.40	0.01	0.04	0.03			
Total PO_4	"	1.20	0.10	0.31	0.25	4.40	0.09	0.54	0.40			
Iron	"	48.0	2.2	9.2	5.9	109.0	2.6	33.3	27.0			
Cyanide	"	0.80	0.00	0.22	0.19	0.61	0.01	0.29	0.30			
Susp. Solids	"	130	26	57	54	842	29	113	92			
Dis. Solids	"	380	170	237	230	385	109	234	231	500	-	-
Phenol	ug/l	392	10	103	63	601	8	129	66	20	-	-
		Data based on 51 samples				Data based on 52 samples						

Station 2 - Indiana Harbor Canal at 151st St.

This station is located immediately downstream of the point where the eastern and western portions of the Grand Calumet River converge to form the Indiana Harbor Canal. The quality of the water entering the canal which eventually reaches Lake Michigan is measured at this point. Effluents from the Gary, Hammond and East Chicago sewage treatment plants as well as effluents from several industries on the Grand Calumet River affect this point. All of the sewage treatment plants are chlorinating their effluents at present.

Figure 4 on page 25 shows that the bacterial quality still did not meet the criteria. Figure 4 also shows an increase in bacterial counts during April, May and June of 1967. This increase may be explained by three factors: the heavy rainfall during April and May which increased the flow from combined sewer overflows, the increased temperature of the water and an experiment which was conducted at the Gary sewage treatment plant to determine if coke mill wastes from the U. S. Steel complex could be treated at the plant. The treatment of these wastes by the activated sludge process resulted in a great reduction in cyanide and phenol content but produced a very high concentration of ammonia in the plant's effluent. This ammonia combined with the chlorine to form chloramines, thereby greatly reducing the effect of the chlorination process. The plant did not have sufficient chlorination capacity to produce a free residual; therefore the bacterial counts in the effluent were high.

The increase in industrial wastes noted at Station 1 is also evident at Station 2. Figure 5 on page 26 and Table 2 on page 27 show the increased concentrations of iron and phenol. During January and February of 1967 phenol concentrations were 100 micrograms per liter (µg/1) higher than during January and February of 1966 in spite of slightly higher water temperatures. On March 1, 1967, a heavy slug of phenolic materials was found at this station. The concentration was 16,750 µg/1 and the sample had a strong odor. The Hammond and East Chicago water treatment plant operators were notified and a special sampling run was made on March 2, 1967, but the estuarial effect of Lake Michigan on the canal dispersed the slug and made it impossible to trace. Phenol concentrations at the downstream stations were only slightly higher than normal for that time of the year. Moderately high threshold odors were reported by the East Chicago and Hammond water filtration plants during the following week. An investigation by the Indiana Stream Pollution Control Board revealed that the slug originated at the United States Steel Company in Gary when an employee "mistakenly discharged the wrong vat to the river."

Low pH values accompanied by high concentrations of sulphates indicate that this station is still affected by discharges of pickling liquor wastes.

Samples from this station were composited on a monthly basis and analyzed for heavy metals. The following table compares the average values for July to December 1966 and January to June 1967:

	July-Dec. 1966	Jan.-June 1967
Cadmium	less than 0.005 mg/l	less than 0.005 mg/l
Copper	0.07 "	0.03 "
Chromium	0.07 "	0.05 "
Potassium	4.6 "	4.6 "
Manganese	0.24 "	0.47 "
Lead	0.14 "	0.16 "
Nickel	0.03 "	0.03 "
Zinc	1.17 "	1.20 "
Sodium	18 "	20 "
Arsenic	less than 1 µg/l	30 µg/l

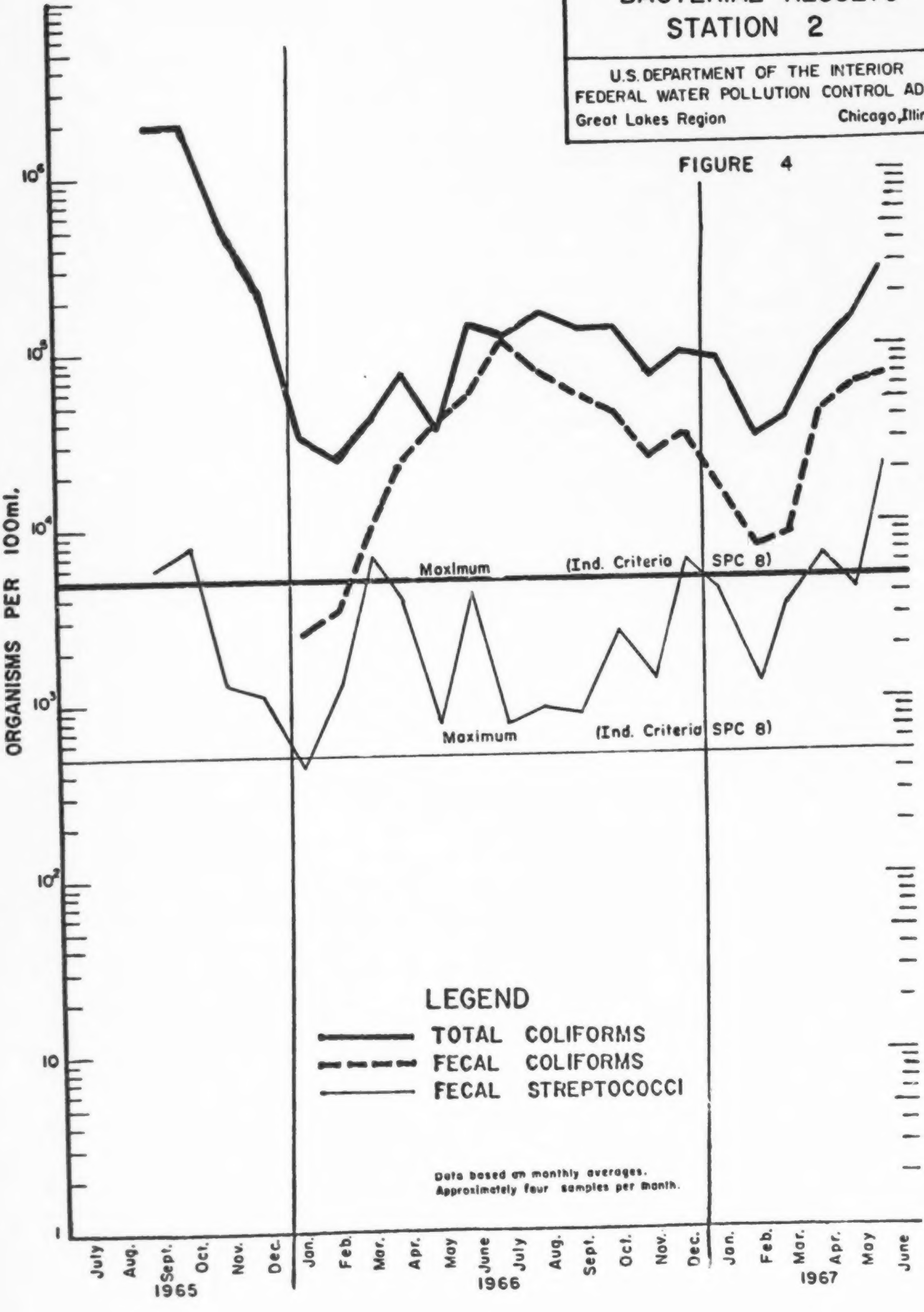
Except for arsenic the data does not indicate any increase or decrease in the concentrations of these elements. During 1967 arsenic was detected in March, April and May. None was found during January, February or June. It is probable that these results represent slugs that were caught by the samplers. It is possible for such slugs to be missed by a weekly sampling program; therefore this arsenic is probably not a new contaminant but one that was periodically present but not detected during 1966.

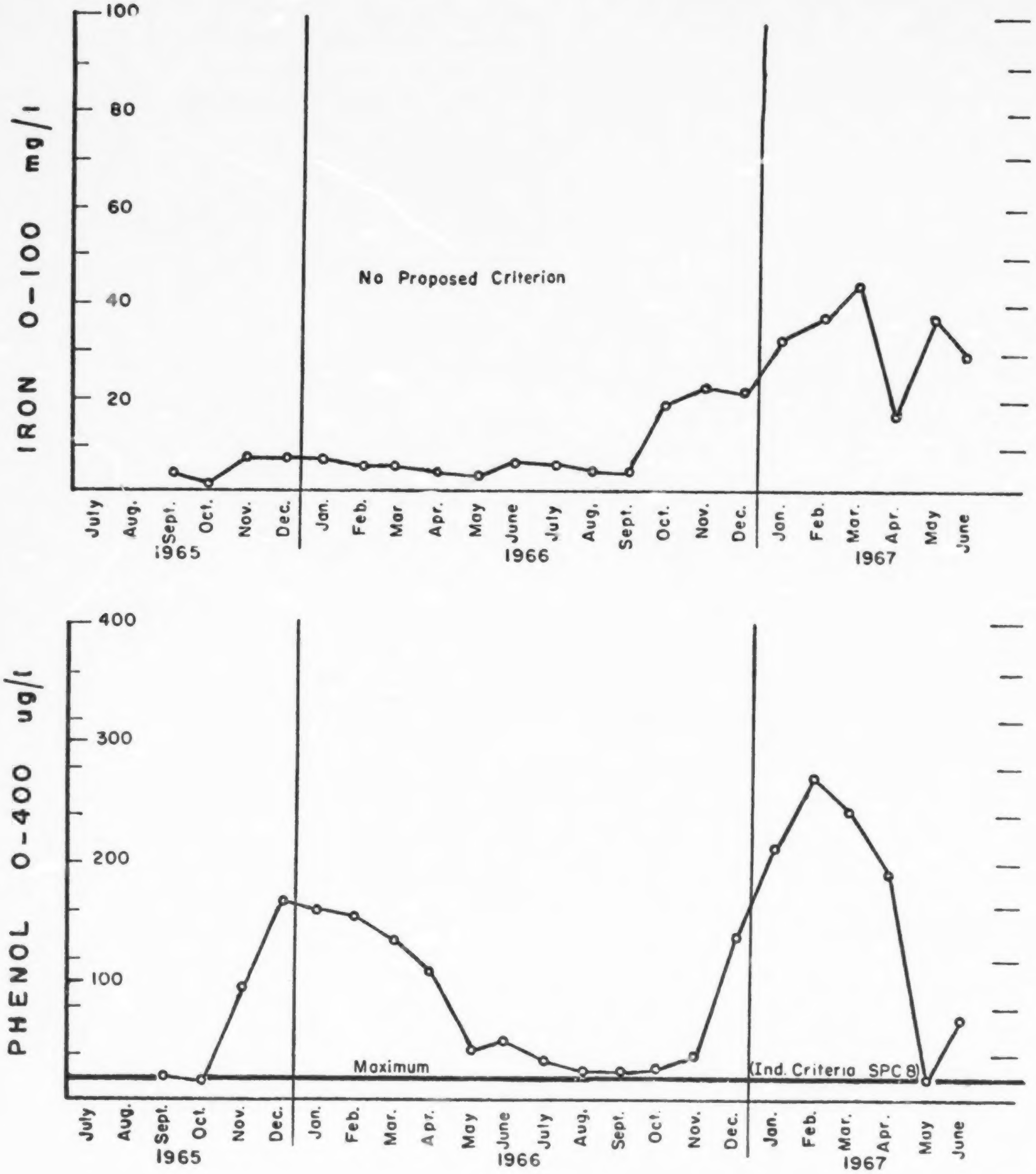
CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 2

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 4





CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 2
Indiana Harbor Canal
at 151st Street

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

Data based on monthly averages.
Approximately four samples per month.

FIGURE 5

TABLE 2

CHEMICAL QUALITY OF WATER

STATION 2 - INDIANA HARBOR CANAL - 151ST STREET-IHC 331.9

Parameter		Sept. 65 - June 66				July 66 - June 67				Standards Adopted Indiana for Grand Calumet River *		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	27	5	16	16	31	8	19	16	32.3	-	-
pH		7.9	6.3	-	7.0	7.5	6.3	-	6.9			Med. 6.5-9.0
Conductivity	umho/cm	530	430	473	480	590	330	477	464			
Alkalinity	mg/1	-	-	-	-	174	51	110	107			
DO	"	8.10	0.20	4.80	4.60	7.40	0.85	4.33	4.45	-	1.0	3.0 (May-Sept)
BOD	"	22.0	4.4	8.9	8.1	14.0	4.8	9.7	9.4	10	-	-
COD	"	148	50	34	30	179	17	40	39			
Sulphates	"	138	50	76	74	125	36	73	73			
Chlorides	"	44	22	29	29	50	16	28	27	125	-	75
MBAS	"	0.35	0.17	0.24	0.24	0.42	0.10	0.23	0.23	0.5		
NH_3-N	"	4.70	0.77	3.01	3.00	5.9	1.6	3.8	3.3	5.0	-	-
NO_2+NO_3-N	"	2.20	0.21	0.94	0.85	1.70	0.08	0.62	0.58			
Org. N	"	4.30	0.00	0.83	0.80	5.0	0.1	0.9	0.9			
Sol. PO_4	"	1.32	0.11	0.54	0.49	1.00	0.05	0.37	0.32			
Total PO_4	"	4.60	0.32	1.00	0.96	4.30	0.56	1.67	1.70			
Iron	"	17.00	0.78	5.11	3.50	69.0	2.8	21.2	19.0			
Cyanide	"	0.53	0.00	0.16	0.13	0.61	0.04	0.21	0.15			
Susp. Solids	"	136	10	53	51	239	7	79	70			
Dis. Solids	"	640	240	296	290	345	160	275	275	500	-	-
Phenol	ug/1	308	9	92	93	16,757	15	100	48	20	-	-
		Data based on 44 samples				Data based on 52 samples						

*Due to the size of the stream at this point and its proximity to the Grand Calumet River, SPC 8 is more applicable than SPC 7 which applies to the lower end of the Indiana Harbor Canal.

Station 3 - Indiana Harbor Canal at Dickey Road

Station 3 is located at Dickey Road Bridge on the Indiana Harbor Canal. This station is downstream from the St. George Branch of the Indiana Harbor Canal and receives the wastes from all of the refineries which discharge to the canal system.

Fluctuating lake levels cause the canal to act as an estuary in this area. The water level in the canal fluctuates two to three feet every six hours. Flow is often upstream at Dickey Road. The net discharge is estimated to be 1100 to 1200 cubic feet per second (cfs) toward Lake Michigan.

Figure 6 on page 30 indicates declining bacterial counts until April 1967 when they rose sharply. This rise was due to the combined sewer overflows caused by heavy rainfalls that occurred during these months and to the higher summer temperatures.

The recently approved water quality standards permit a maximum total coliform count of 5000 per 100 ml and an annual average of not more than 2000 per 100 ml. During January to June 1967 the maximum coliform count was 1,500,000 per 100 ml with an average of 325,880 per 100 ml. It is evident that a great deal must be done to meet these goals, particularly in respect to combined sewer overflows.

The extent of the industrial pollution problem is indicated by comparing the standards for iron, cyanide, dissolved solids and phenolic compounds with the existing levels in the stream. Table 3 on page 33 indicates that the existing levels for each of these parameters were many times higher than the standards. Figures 7 and 8 on pages 31 and 32 indicate that concentrations of these pollutants have increased during the past two years.

Low dissolved oxygen was an increasing problem at this point. During June 1967 zero dissolved oxygen was found in two of four samples. The dissolved oxygen was less than 1.0 milligrams per liter (mg/l) after the beginning of May. During 1966 dissolved oxygen contents less than 1.0 mg/l were not found until June 3.

Samples from this station were composited on a monthly basis and analyzed for heavy metals. The following table compares the average values for July to December 1966 and January to June 1967.

R. J. Bowden

	July Dec. 1966	Jan.-June 1967
Cadmium	less than 0.005 mg/l	less than 0.005 mg/l
Copper	0.08 "	0.05 "
Chromium	0.04 "	0.01 "
Potassium	4.5 "	4.8 "
Manganese	0.22 "	0.32 "
Lead	0.06 "	0.07 "
Nickel	0.03 "	0.04 "
Zinc	0.63 "	0.52 "
Sodium	21 "	24 "
Arsenic	less than 1 µg/l	6 µg/l

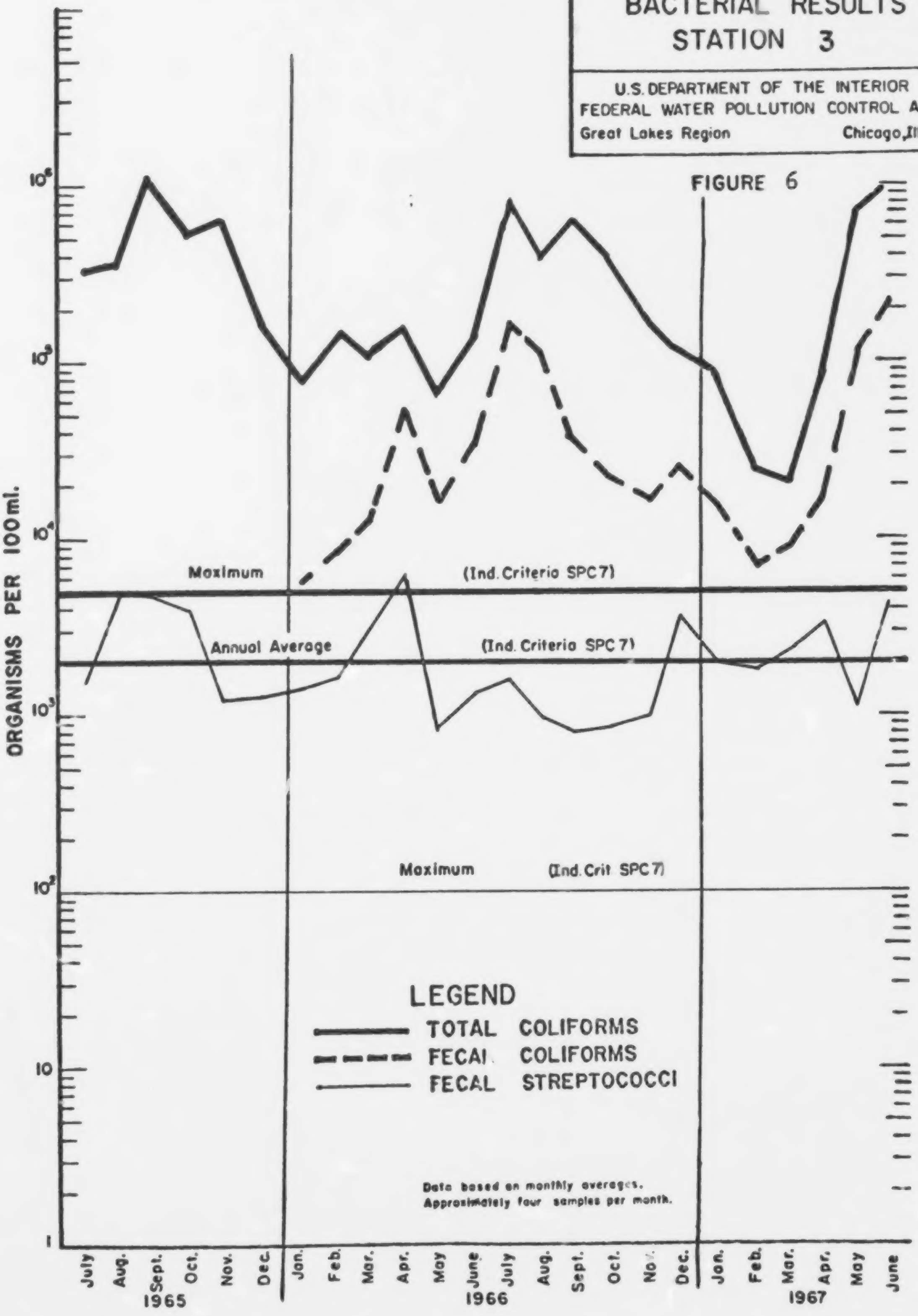
As at Station 2, the data does not indicate a definite trend. Significant arsenic was found in only the March 1967 composite, indicating that a slug was detected. It is probable that such slugs existed but were missed during 1966.

CALUMET AREA SURVEILLANCE PROJECT

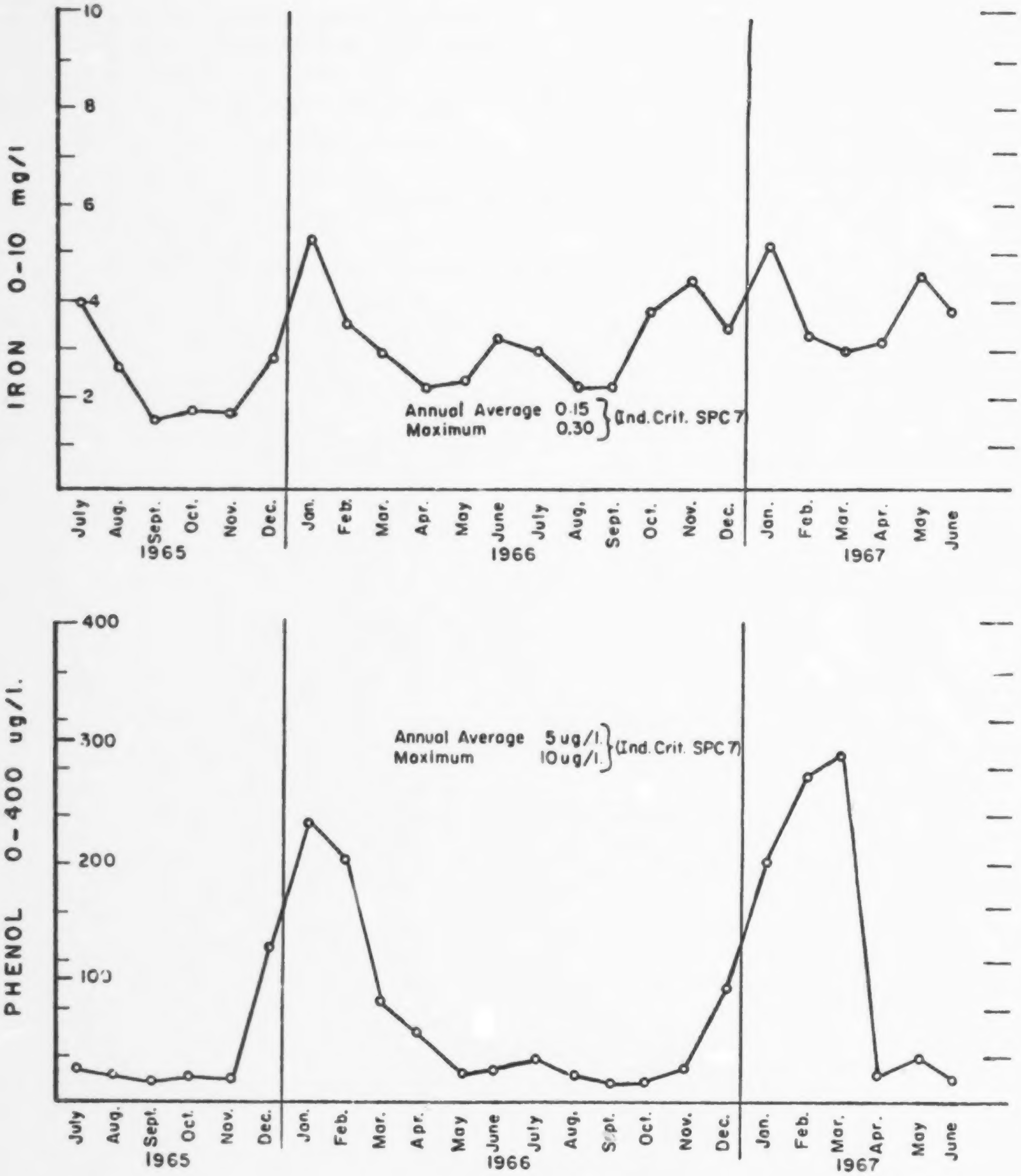
BACTERIAL RESULTS STATION 3

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 6



Data based on monthly averages.
Approximately four samples per month.



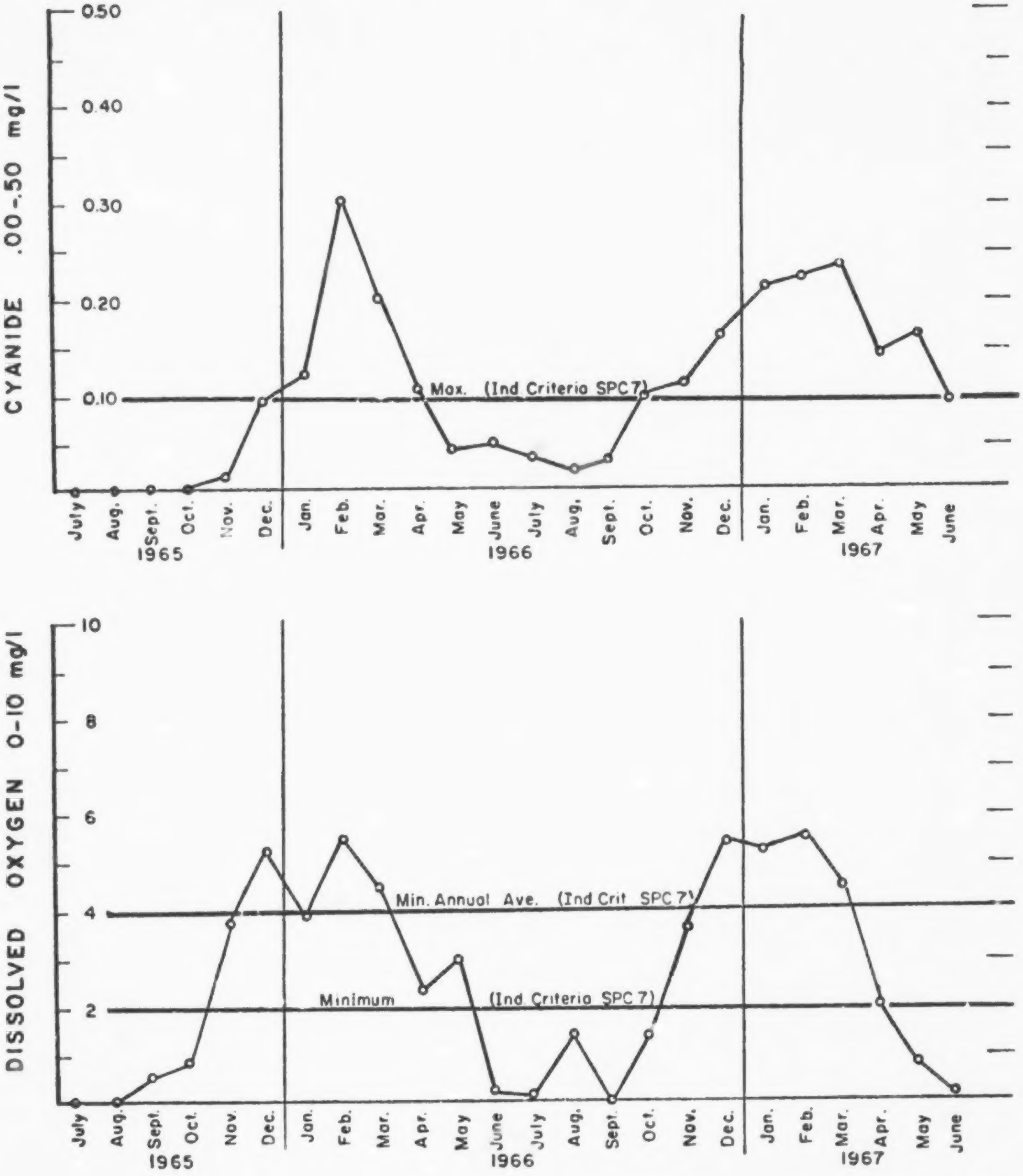
Data based on monthly averages.
Approximately four samples per month.

FIGURE 7

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 3
Indiana Harbor Canal
at Dickey Road Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois



Data based on monthly averages.
Approximately four samples per month.

FIGURE 8

CALUMET AREA SURVEILLANCE PROJECT

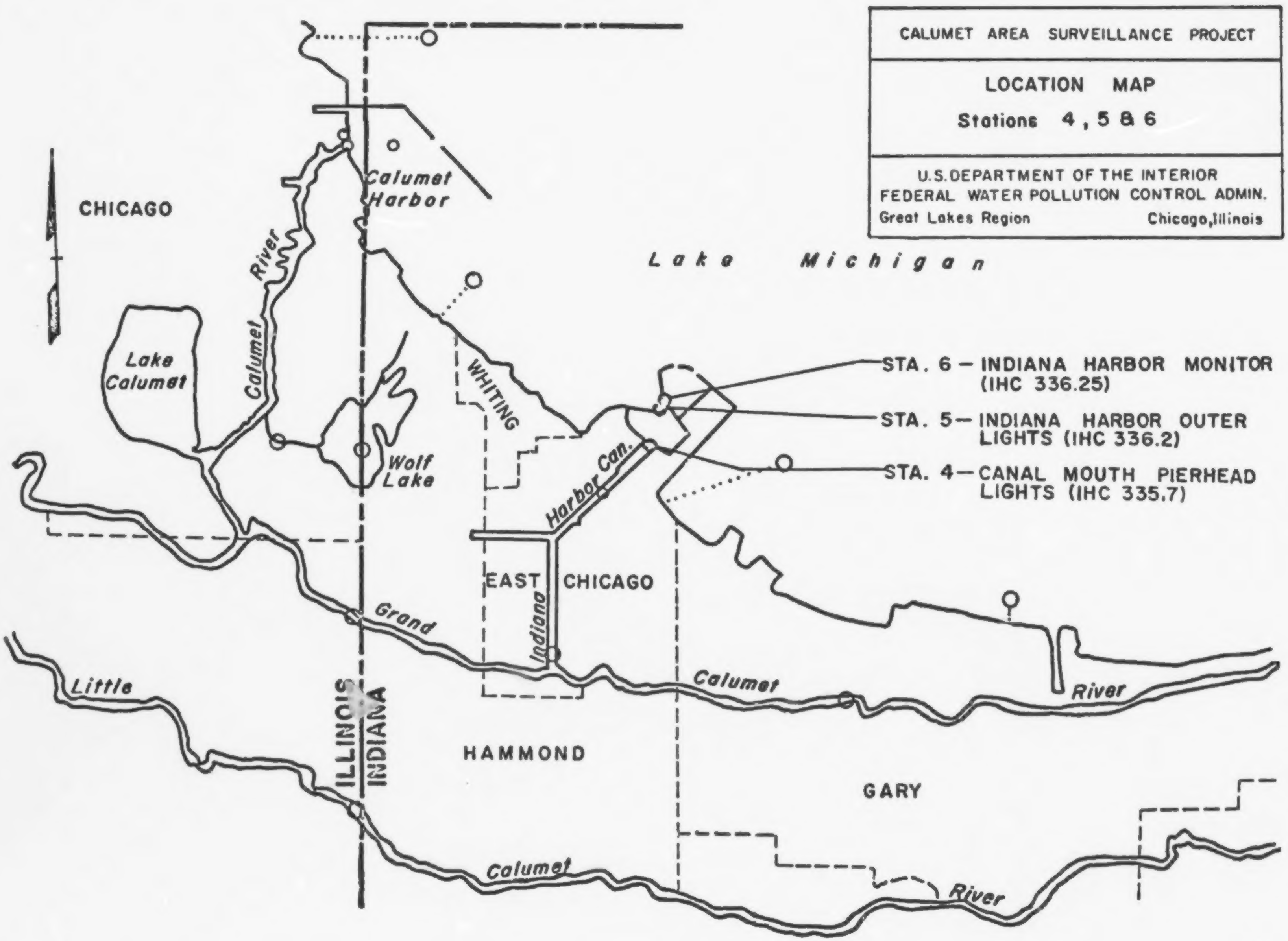
CHEMICAL RESULTS
STATION 3
Indiana Harbor Canal
at Dickey Road Bridge

U.S DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

TABLE 3

CHEMICAL QUALITY OF WATER
STATION 3 - INDIANA HARBOR CANAL AT DICKEY ROAD-IHC 334.6

		July 65 - June 66				July 66 - June 67				Standards Adopted by Indiana (Spc 7)		
Parameter		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	29	9	18	18	31	7	18	16	32.3	-	-
pH		8.0	6.3	-	7.0	7.6	6.4	7.0	6.9	9.0	7.0	Med. 7.5-8.5
Conductivity	umho/cm	615	400	501	505	800	410	507	495			
Alkalinity	mg/l	-	-	-	-	139	56	105	111			
DO	"	6.70	0.00	2.46	1.80	7.2	0.0	2.5	2.4	-	2.0	4.0
BOD	"	11.0	2.2	5.7	5.4	18.0	2.5	6.0	5.2			
COD	"	147	0	28	22	53	12	27	24			
Sulphates	"	138	45.6	79	80	155	42	80	80	75		60
Chlorides	"	70	29	36	32	59	22	36	33	35	-	25
MBAS	"	0.61	0.16	0.29	0.29	0.59	0.17	0.35	0.31	0.5		0.3
NH_3-N	"	6.7	1.1	3.1	3.1	5.8	1.5	3.9	3.8	1.5		1.0
NO_2+NO_3-N	"	3.50	0.15	1.00	0.85	2.40	0.03	0.70	0.58			
Org. N	"	5.40	0.08	1.19	0.80	4.5	0.2	1.1	0.8			
Sol PO_4	"	0.86	0.04	0.31	0.29	0.51	0.08	0.24	0.22			
Total PO_4	"	1.10	0.24	0.53	0.48	1.30	0.05	0.76	0.73	.10		.05
Iron	"	9.00	0.88	2.75	2.20	10.0	1.6	3.4	3.1	.30		.15
Cyanide	"	0.56	0.00	0.08	0.02	0.43	0.01	0.12	0.11	0.1		-
Susp. Solids	"	84	6	20	17	64	4	22	20			
Dis. Solids	"	385	220	303	305	360	141	295	291	275		
Phenol	ug/l	483	1	71	30	635	5	93	32	10		5
		Data based on 52 samples				Data based on 52 samples						



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

Stations 4, 5 & 6

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

STA. 6 — INDIANA HARBOR MONITOR (IHC 336.25)
STA. 5 — INDIANA HARBOR OUTER LIGHTS (IHC 336.2)
STA. 4 — CANAL MOUTH PIERHEAD LIGHTS (IHC 335.7)

Stations 4, 5 and 6 - Indiana Harbor

Indiana Harbor was sampled at three points. Station 4 is located at the mouth of Indiana Harbor Canal, upstream of the Inland Steel and Youngstown Sheet and Tube ship turning basin. Station 5 is located immediately downstream of the ship turning basins and downstream of all industrial discharges to the harbor. The average dry weather flow to Lake Michigan past this station is 2700 cfs, but under certain wind and lake level conditions lake water is backed up into the harbor creating the effect of an estuary. Station 6 is located at the east breakwall inner light which is about 150 feet from Station 5 and contains a water quality monitoring station.

Stations 4 and 5 are boat stations and cannot be sampled in rough weather. During 1967 they were not sampled until May 5 and were missed several times thereafter. A comparison of the monthly data from Station 5 and 6 reveals that there is no essential difference in water quality between the two points. Therefore sampling of Station 5 was discontinued as of July 1967.

Figures 9, 10 and 11 on pages 36, 37 and 38 indicate that bacterial counts at these three stations did not meet the standards. The high counts during May and June were probably due to overflows from combined sewers resulting from the heavy rainfalls.

Tables 4 and 5 on pages 40 and 41 show high iron, cyanide and phenol concentrations at each of these points which indicate the continued presence of heavy industrial pollution.

Station 6 is the control point designated by the Indiana Stream Pollution Control Board for the Indiana Harbor Canal. Table 6 on page 42 and Figure 12 on page 39 compare the proposed criteria with the actual water quality for the past two twelve-month periods. The criteria for temperature is being met. The median pH is below the range required by the criteria. In general the criteria for dissolved oxygen is met. This is because most of the oxygen demand is satisfied before the wastes reach this point and higher quality water from Lake Michigan often intrudes into the harbor. The criteria for sulphates, chlorides, ammonia and phosphate were not met. The most serious problems are iron, cyanides and phenols. The criterion for iron has often been violated and the criteria for phenols and cyanides were extensively violated during the colder months.

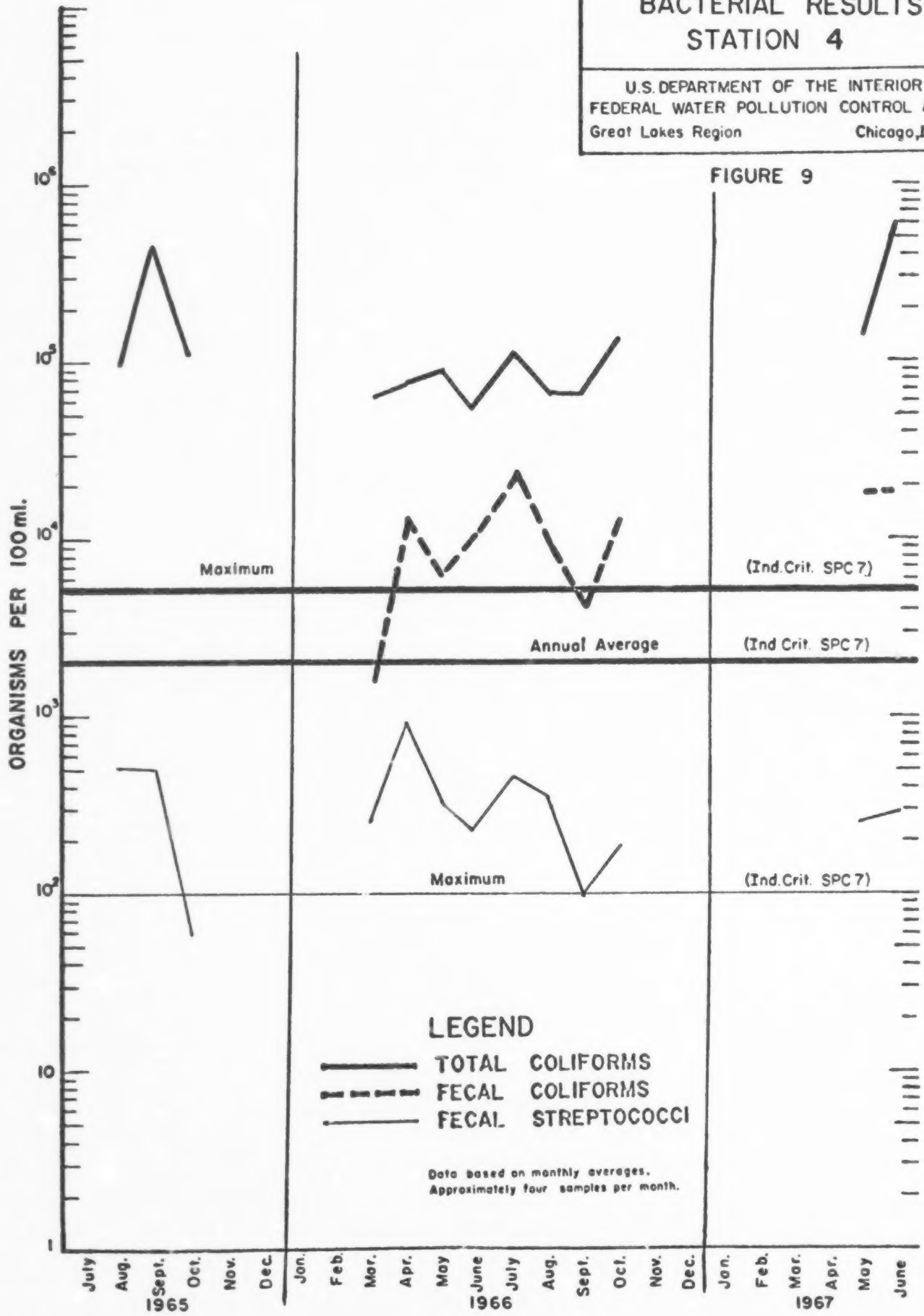
The bacterial criteria were violated in more than 95% of the samples. Many of the subjective criteria such as those calling for freedom from floating oil, floating solids and debris, odor and turbidity were also violated. The samplers reported floating oil on almost every sampling run and the waters often are turbid and have an unpleasant odor.

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 4

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 9

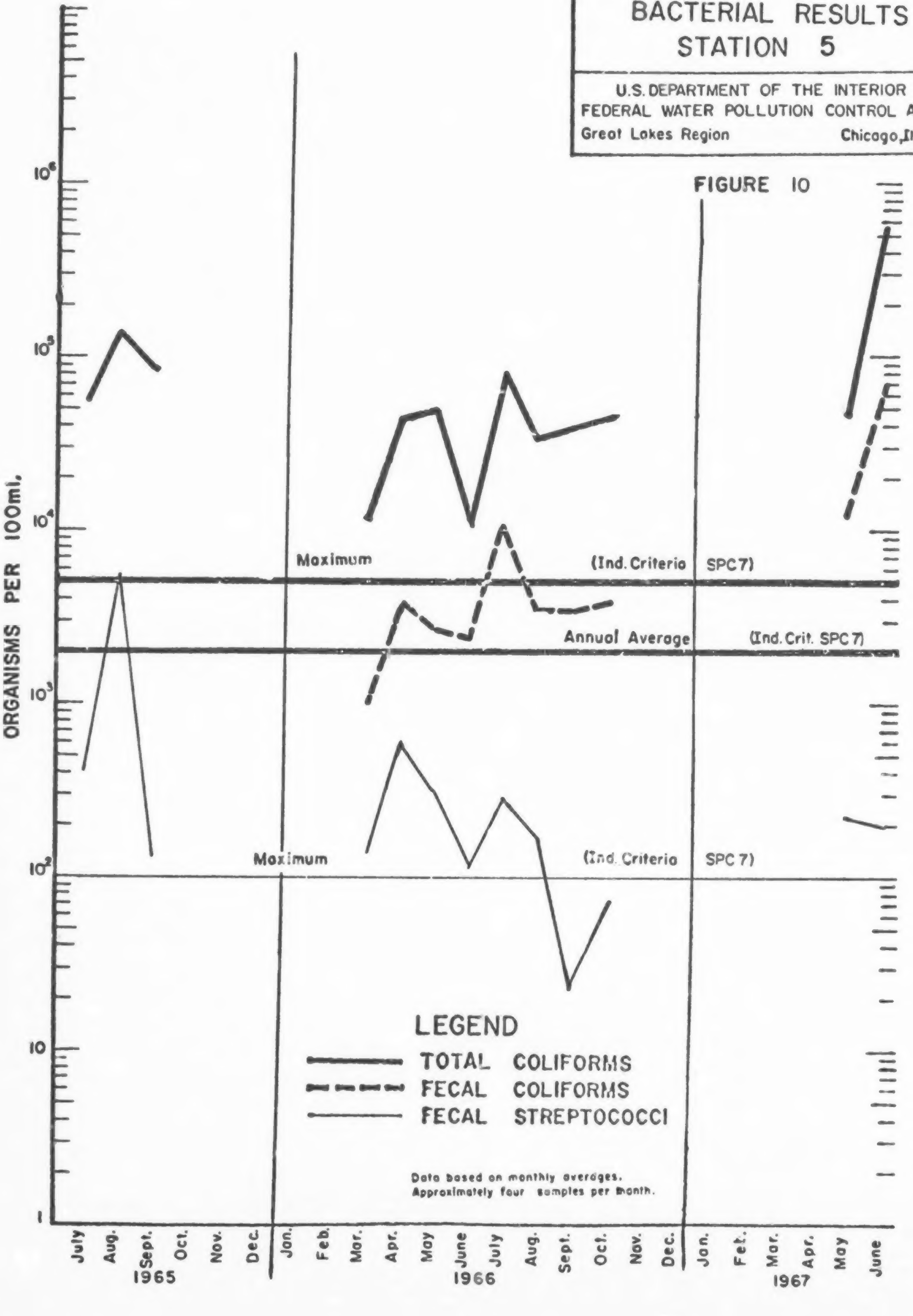


CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS STATION 5

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 10



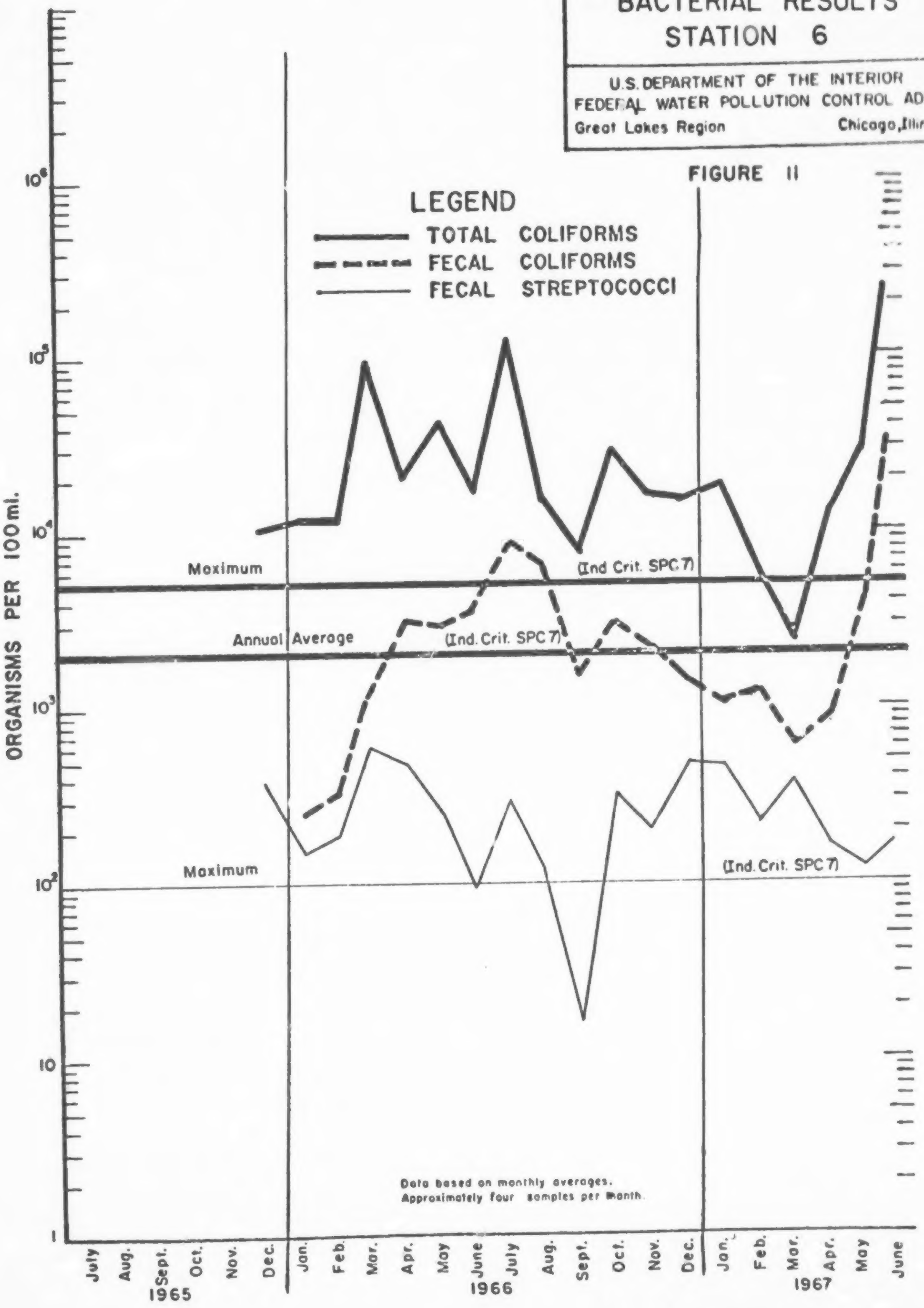
Data based on monthly averages.
Approximately four samples per month.

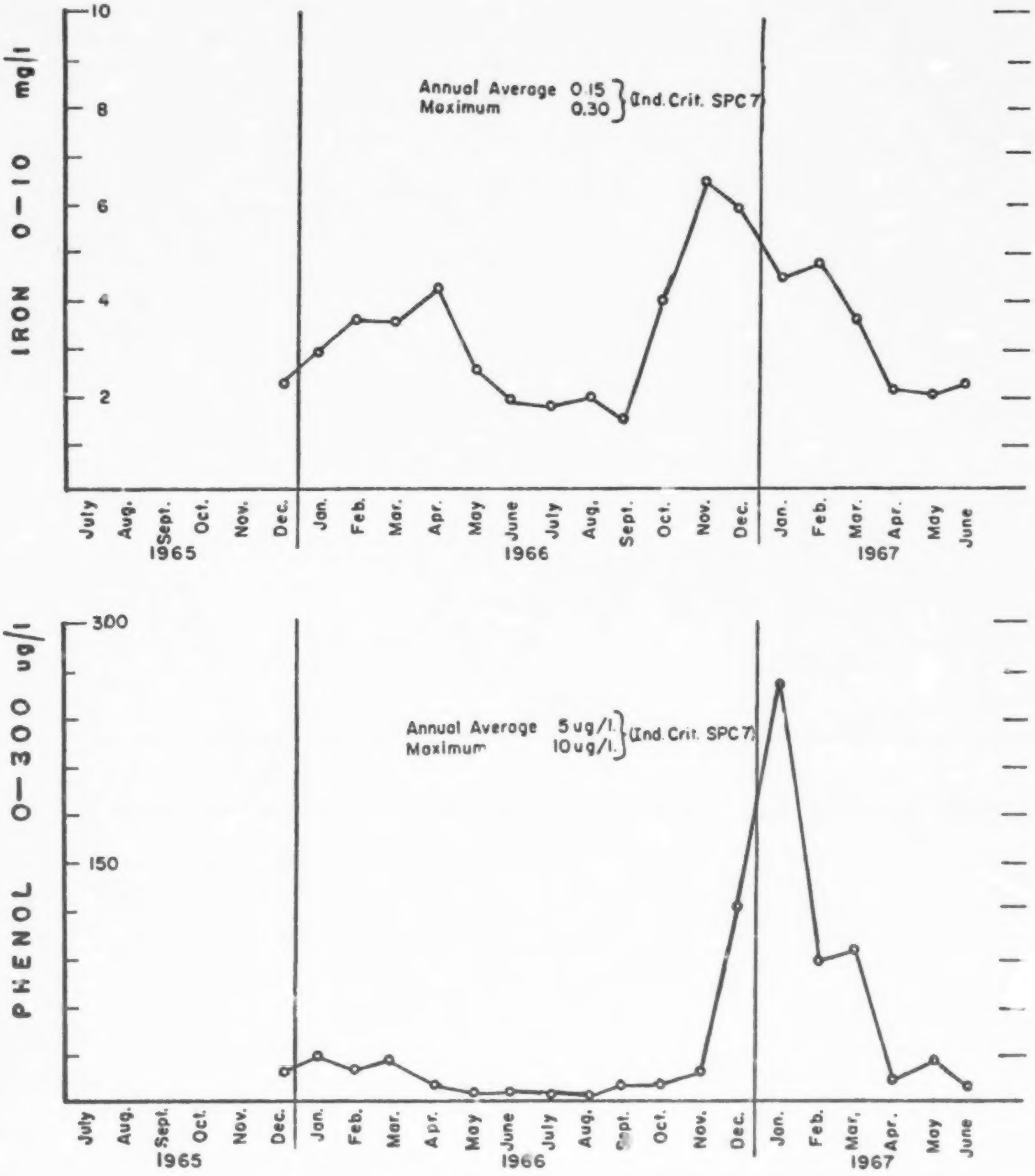
CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 6

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN
Great Lakes Region Chicago, Illinois

FIGURE 11





CALUMET AREA SURVEILLANCE PROJECT
CHEMICAL RESULTS **STATION 6** Indiana Harbor East Breakwall Inner Light
U.S. DEPARTMENT OF THE INTERIOR FEDERAL WATER POLLUTION CONTROL ADMIN. Great Lakes Region Chicago, Illinois

Data based on monthly averages.
Approximately four samples per month.

FIGURE 12

TABLE 4

CHEMICAL QUALITY OF WATER
STATION 4 - INDIANA HARBOR CANAL AT PIERHEAD LIGHTS-IHC 335.7

Parameter		August 65 - June 66				July 66 - June 67				Standards Adopted by Indiana (Spc 7)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	26	11	19	19	29	14	23	25	32.3	-	-
pH		8.0	6.8	-	7.0	8.0	6.8	-	7.1	9.0	7.0	Med. 7.5-8.5
Conductivity	umho/cm	460	385	419	420	485	301	385	395			
Alkalinity	mg/l	-	-	-	-	109	51	87	91			
DO	"	6.60	2.05	3.77	3.50	7.20	0.90	3.42	3.10	-	2.0	4.0
BOD	"	9.1	2.4	4.1	3.9	7.0	2.8	4.2	3.9			
COD	"	126	0	22	14	58	6	9	19			
Sulphates	"	84	23	60	59	90	36	57	59	75		60
Chlorides	"	30	21	25	25	35	10	23	22	35		25
MBAS	"	0.25	0.07	0.17	0.17	0.93	0.10	0.22	0.18	0.5		0.3
NH_3-N	"	5.60	0.75	2.47	2.50	4.7	0.8	2.5	2.4	1.5		1.0
NO_2+NO_3-N	"	0.74	0.11	0.35	0.36	0.80	0.10	0.40	0.37			
Org. N	"	1.74	0.00	0.60	0.60	1.8	0.0	0.7	0.5			
Sol PO_4	"	0.19	0.03	0.11	0.10	0.14	0.03	0.06	0.07			
Total PO_4	"	0.29	0.08	0.18	0.19	0.44	0.09	0.20	0.24	.10		.05
Iron	"	5.0	1.5	3.0	2.9	44.0	1.2	5.0	2.6	.30		.15
Cyanide	"	0.25	0.00	0.04	0.06	0.09	0.02	0.04	0.03	0.1		-
Susp. Solids	"	107	11	25	14	73	7	20	20			
Dis. Solids	"	305	215	254	260	295	130	221	224	275		
Phenol	ug/l	42	6	17	16	84	5	20	9	10		5
Turbidity	units	-	-	-	-	3.4	2.5	-	-			
		Data based on 19 samples				Data based on 20 samples						

NOTE: This station was not sampled during winter months.

TABLE 5

CHEMICAL QUALITY OF WATER
STATION 5 - INDIANA HARBOR AT INNER BREAKWALL LIGHTS-IHC 336.2

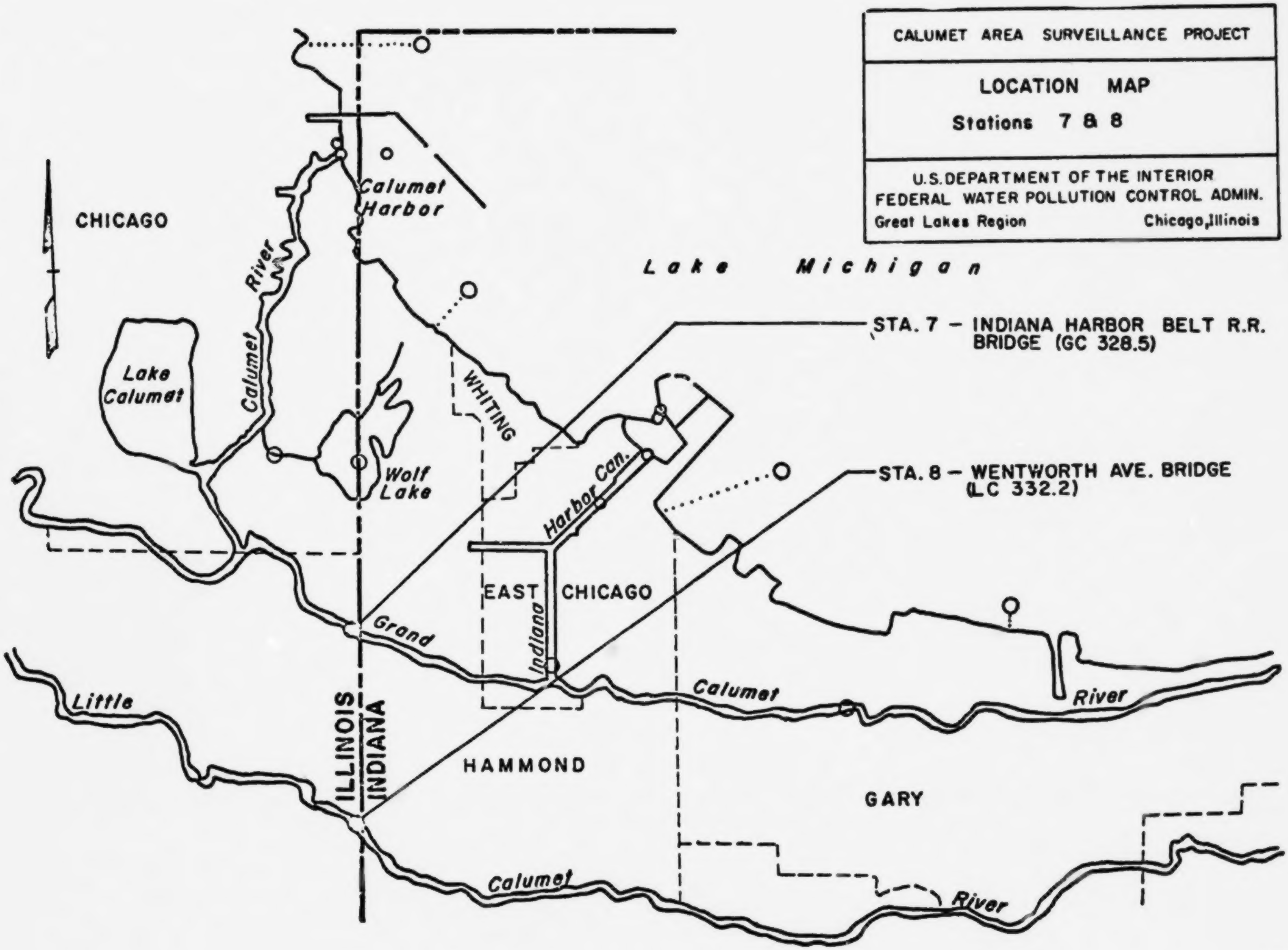
		August 65 - June 66				July 66 - June 67				Standards Adopted by Indiana (Spc 7)		
Parameter		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	26	10	18	19	29	12	22	24	32.3	-	-
pH		7.9	6.8	-	7.0	8.0	6.6	-	7.1	9.0	7.0	Med. 7.5-8.5
Conductivity	umho/cm	420	350	384	385	435	330	368	370			
Alkalinity	mg/l	-	-	-	-	94	72	87	89			
DO	"	6.80	1.85	4.61	3.75	6.40	0.60	3.38	3.35	-	2.0	4.0
BOD	"	13.0	2.0	3.7	3.1	4.4	2.2	3.1	3.1			
COD	"	121	8	22	12	31	6	16	17			
Sulphates	"	81	32	56	54	76	35	50	49	75		60
Chlofides	"	26	16	22	23	30	16	23	23	35	-	25
MBAS	"	0.21	0.10	0.14	0.014	0.32	0.09	0.16	0.14	0.5		0.3
NH_3-N	"	4.40	0.38	1.90	1.90	3.5	1.1	2.0	2.1	1.5		1.0
NO_2+NO_3-N	"	0.59	0.12	0.34	0.35	5.00	0.09	0.57	0.31			
Org. N	"	1.38	0.00	0.38	0.30	1.5	0.0	0.5	0.5			
Sol PO_4	"	0.12	0.00	0.07	0.07	0.12	0.03	0.06	0.06			
Total PO_4	"	0.31	0.06	0.14	0.14	0.37	0.09	0.19	0.20	.10		.05
Iron	"	5.60	1.25	2.61	2.55	3.8	1.3	2.5	2.6	.30		.15
Cyanide	"	0.19	0.00	0.04	0.01	0.14	0.01	0.04	0.03	0.1		-
Susp. Solids	"	37	3	12	12	210	1	36	13			
Dis. Solids	"	280	205	239	235	379	175	229	220	275		
Phenol	ug/l	23	0	9	7	41	3	12	11	10		5
Turbidity	units	11.2	1.8	6.3	6.2	13.0	1.6	5.1	4.2			
		Data based on 19 samples				Data based on 20 samples						

NOTE: This station was not sampled during winter months.

TABLE 6

CHEMICAL QUALITY OF WATER
STATION 6 - INDIANA HARBOR AT EAST BREAKWALL INNER LIGHT
(WATER QUALITY MONITOR STATION)-IHC 336.25

Parameter		January 66 - June 66				July 66 - June 67				Standards Adopted by Indiana (Spc 7)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	19	6	12	12	29	3	16	14	32.3	-	-
pH		8.0	6.6	-	7.0	8.0	6.7	-	7.1	9.0	7.0	Med. 7.5-8.5
Conductivity	umho/cm	460	320	372	385	500	280	384	370			
Alkalinity	mg/l	-	-	-	-	115	79	98	99			
DO	"	8.00	2.80	6.50	7.10	9.10	1.15	6.62	7.00	-	2.0	4.0
BOD	"	5.6	1.7	3.4	3.6	13.0	1.2	3.9	3.7			
COD	"	37	4	12	11	72	5	17	14			
Sulphates	"	77	34	59	66	70	19	46	45	75		60
Chlorides	"	32	10	21	22	40	9	24	23	35		25
MBAS	"	0.35	0.08	0.15	0.15	0.30	0.05	0.17	0.15	0.5		0.3
NH_3-N	"	2.80	0.19	1.90	1.90	4.10	0.56	1.85	1.7	1.5		1.0
NO_2+NO_3-N	"	0.79	0.12	0.42	0.40	0.80	0.10	0.41	0.41			
Org. N	"	2.1	0.2	0.6	0.5	2.7	0.0	0.5	0.4			
Sol PO_4	"	0.30	0.03	0.09	0.08	0.91	0.01	0.07	0.06			
Total PO_4	"	0.34	0.08	0.14	0.13	1.40	0.08	0.23	0.18	.10		.05
Iron	"	8.1	1.3	3.1	3.0	15.0	0.8	3.3	2.7	.30		.15
Cyanide	"	0.20	0.00	0.08	0.07	0.36	0.00	0.17	0.03	0.1		-
Susp. Solids	"	46	8	17	15	119	1	20	13			
Dis. Solids	"	265	200	239	240	270	128	224	221	275		
Phenol	ug/l	45	1	16	14	675	2	34	13	10		5
Turbidity	units	-	-	-	-	55.0	1.6	13.8	17.0			
		Data based on 26 samples				Data based on 49 samples						



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

Stations 7 & 8

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

Station 7 - Grand Calumet River at the Indiana Harbor Belt R. R. Bridge

This station is located on the Grand Calumet River in Illinois within a few hundred yards of the Illinois-Indiana State line and reflects the amount of pollution crossing the State line. It is one of the water quality control points established by the Calumet Area Technical Committee.

The dry weather flow in this portion of the stream consists of effluent from the Hammond sewage treatment plant and industrial effluent from a steel mill and several smaller industries.

Figure 13 on page 45 indicates that the December 1966 increase in bacterial levels reported in the previous report continued into the first week of 1967, after which the counts dropped one order of magnitude to the levels achieved between July and November of 1966. The higher counts noted in June 1967 once again reflected the results of combined sewer overflows. Figure 13 also shows that at no time did the counts meet the standards.

Figures 14 and 15 on pages 46 and 47 indicate the concentrations of dissolved oxygen, total phosphate, ammonia and dissolved solids at Station 7. The dissolved oxygen, normally high in winter in an unfrozen stream, dropped sharply during December and January. It is evident that there was heavy sewage pollution during December 1966. The reported bypassing by the Hammond sewage treatment plant is the most likely cause.

Table 7 on page 48 compares the actual water quality with the criteria established by the Calumet Area Conferees and proposed by both the States of Indiana and Illinois. The criteria for water temperature and pH were met. Dissolved oxygen increased during the last twelve months so that the criteria were met except on one occasion when the minimum value of 0.50 mg/l was recorded. The mean for the period May 1966 to September 1966 was 3.03 mg/l, which just meets the criterion of 3.0 mg/l. The criteria for BOD, chlorides, MBAS, ammonia, dissolved solids and phenols were violated many times.

The subjective criteria requiring freedom from floating oil, floating solids and debris, sludge banks and obnoxious odors were often violated. Samplers reported these conditions on many occasions.

Samples from this station were composited on a monthly basis and analyzed for heavy metals. The following table compares the average values for July to December 1966 and January to June 1967.

R. J. Bowden

	July-Dec. 1966	Jan.-June 1967
Cadmium	less than 0.005 mg/l	less than 0.005 mg/l
Copper	0.03 "	0.02 "
Chromium (total)	9.3 "	8.6 "
Potassium	less than 0.005 "	less than 0.005 "
Manganese	0.09 "	0.22 "
Lead	less than 0.005 "	0.04 "
Nickel	0.01 "	0.02 "
Zinc	less than 0.04 "	0.10 "
Sodium	79	88
Arsenic	less than 1 µg/l	8 µg/l

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 7

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

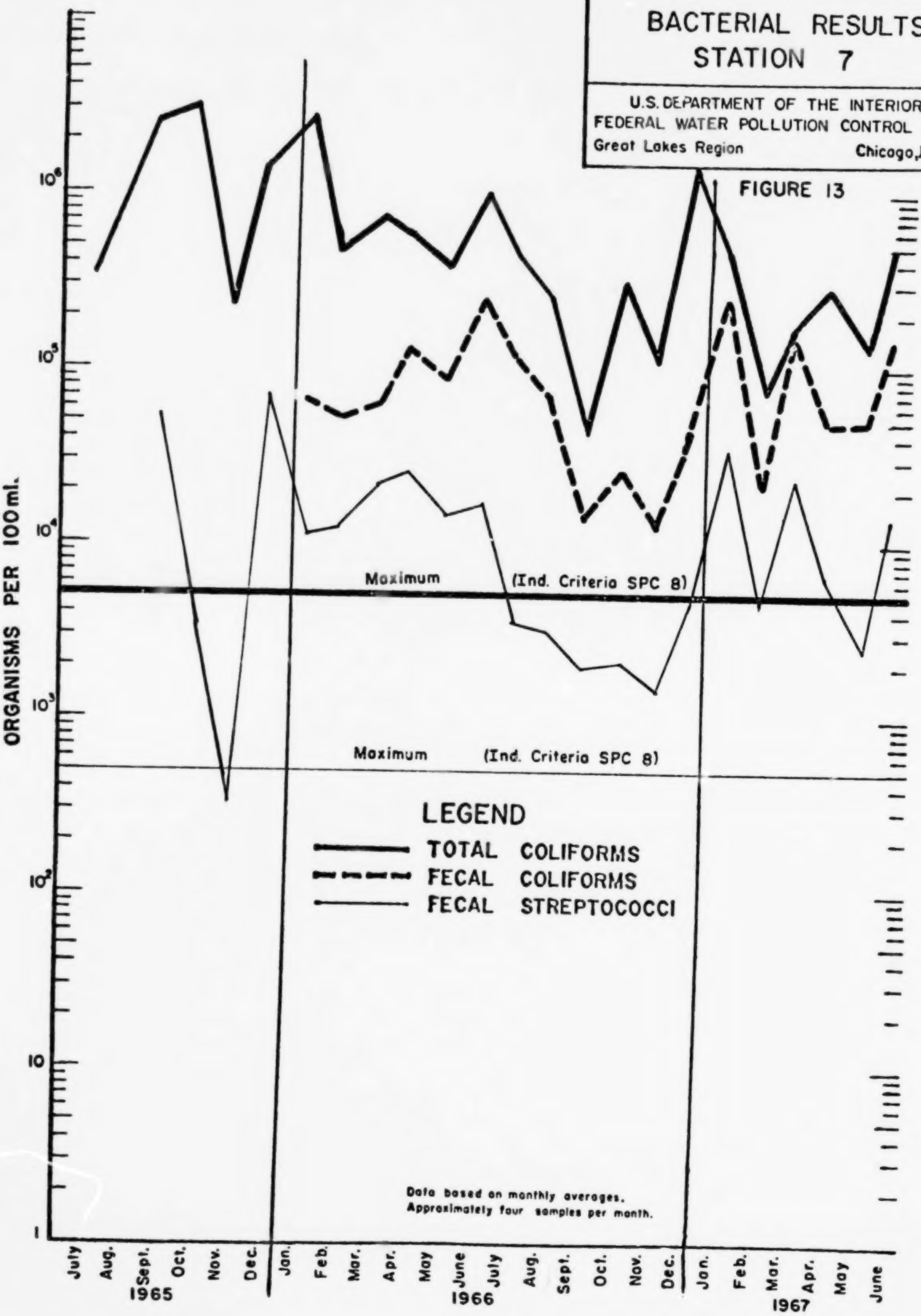
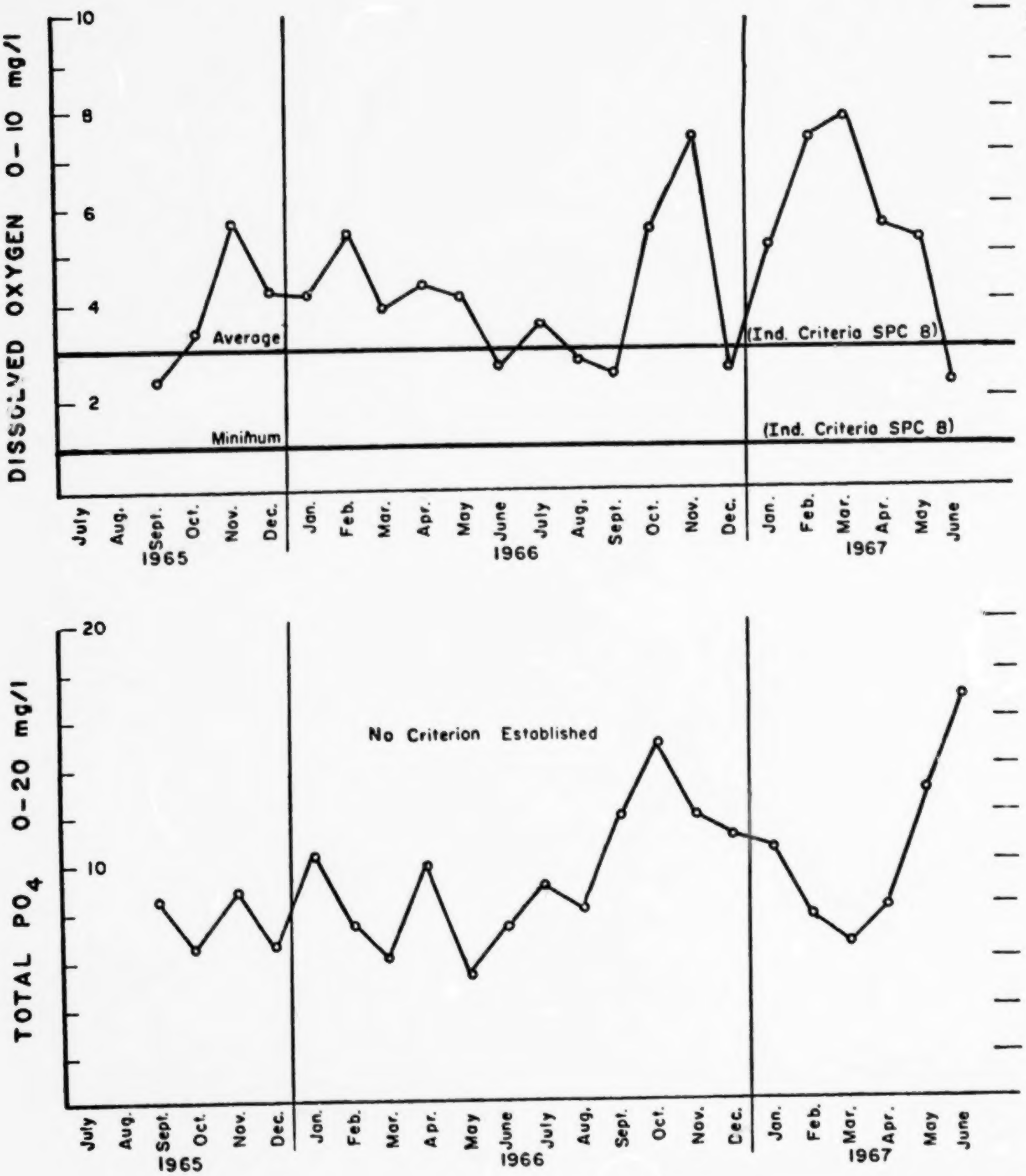


FIGURE 13



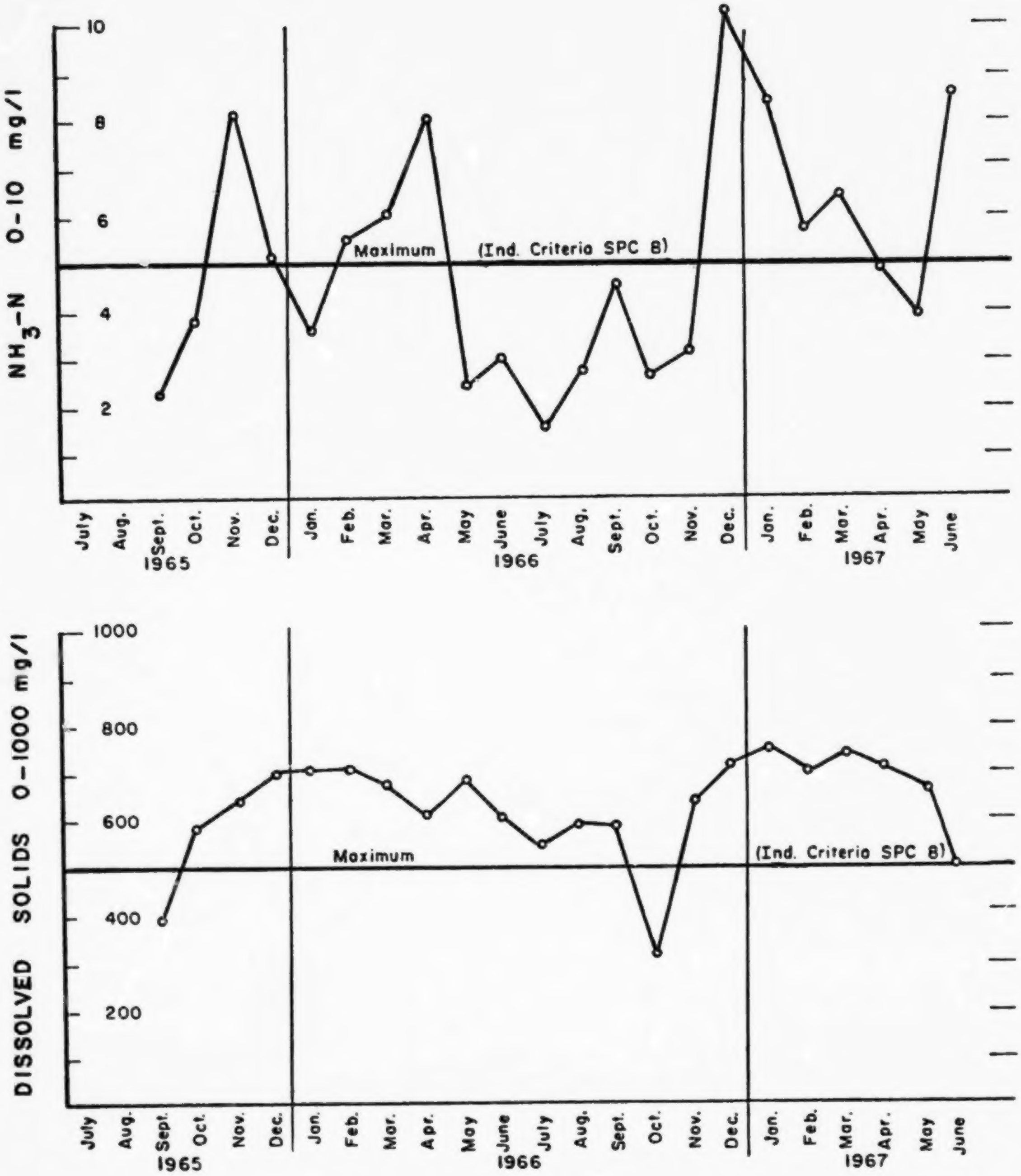
Data based on monthly averages.
Approximately four samples per month.

FIGURE 14

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 7
Grand Calumet River at
Indiana Harbor Belt R.R. Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois



Data based on monthly averages.
Approximately four samples per month.

FIGURE 15

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 7
Grand Calumet River at
Indiana Harbor Belt R.R. Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

TABLE 7

CHEMICAL QUALITY OF WATER
STATION 7 - GRAND CALUMET RIVER AT INDIANA HARBOR BELT R.R. BRIDGE-GC 328.5

Parameter		Sept. 65 - June 66				July 66 - June 67				Standards Adopted by Conferees and by Indiana (Spc 8)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	23	3	12	11	28	0	14	14	32.3	-	-
pH		8.2	6.5	-	7.2	7.3	6.5	-	7.1			Med. 6.5-9.0
Conductivity	umho/cm	1150	410	922	1020	1500	365	1004	1000			
Alkalinity	mg/1	-	-	-	-	253	84	181	177			
DO	"	8.00	0.00	4.05	4.20	11.60	0.50	4.87	5.05		1.0	3.0 (May-Sept)
BOD	"	104.0	3.2	19.0	16.0	89.0	2.6	16.4	10.0	10	-	-
COD	"	224	15	63	52	160	13	59	53			
Sulphates	"	282	52	182	190	430	95	184	180			
Chlorides	"	180	22	87	85	212	29	90	87	125	-	75
MBAS	"	1.80	0.15	0.70	0.63	2.80	0.37	0.71	0.66	0.5		
NH_3-N	"	12.00	0.55	4.67	3.60	14.0	0.3	4.9	4.7	5.0	-	-
NO_2+NO_3-N	"	15.0	1.1	5.8	4.9	14.0	0.2	4.9	4.6			
Org. N	"	6.6	0.05	2.11	1.80	11.9	0.5	2.4	1.9			
Sol PO_4	"	11.0	0.3	4.1	5.3	22.0	0.7	8.2	8.2			
Total PO_4	"	16.0	0.9	7.9	7.3	22.0	4.3	10.7	10.0			
Iron	"	17.00	0.27	2.08	1.30	8.10	0.21	1.23	0.77			
Cyanide	"	0.12	0.00	0.01	0.00	0.05	0.00	0.01	0.01			
Susp. Solids	"	155	5	34	27	102	4	22	18			
Dis. Solids	"	770	185	643	680	925	90	620	610	500		
Phenol	ug/1	90	3	21	15	66	3	15	11	20		
Turbidity	units	19.5	1.8	6.2	5.1	30.0	1.0	8.5	8.0			
		Data based on 44 samples				Data based on 50 samples						

Station 8 - Little Calumet River at Wentworth Ave.

The Wentworth Avenue Station monitors the wastes in the Little Calumet River flowing from Indiana to Illinois. The station is located approximately one-half mile downstream from the State line and is one of the control points established by the Calumet Area Technical Committee.

Figure 16, page 50, indicates that the bacterial counts at Station 8 did not meet the water quality standards. The primary problem on the Little Calumet River is combined sewer overflows; therefore, the heavy rainfall during April and May caused the bacterial counts to rise sharply. The completion of the south side interceptor sewer which will direct much of the sewage to the Hammond Sewage Treatment Plant should improve the condition of the river.

Figures 17 and 18 and Table 8 on pages 51, 52 and 53 show that there has been little significant variation in the remaining parameters. Dissolved oxygen is slightly higher in 1967 but the minimum of 2.0 mg/l was violated three times during June. BOD, MBAS, ammonia, cyanide and phenols are often higher than the maximum permitted by the criteria.

Suspended material in the stream varies widely with flow. During high flow periods suspended material can be over 800 mg/l and when the stream is low, less than

10 mg/l. The average, however, has not changed significantly since 1965.

The criteria call for the stream to be substantially free of floating oil, floating solids and sludge banks. Floating oil and solids have frequently been observed during 1967 and gas bubbles indicate the presence of sludge banks.

Biological sampling of the river bottom at this station revealed a very large population of sludgeworms but little else which indicates extensive organic pollution.

Samples from this station were composited on a monthly basis and analyzed for heavy metals. The following table compares the average values for July to December 1966 and January to June 1967.

	July-Dec. 1966	Jan.-June 1967
Cadmium	less than 0.005 mg/l	less than 0.005 mg/l
Copper	0.07 "	0.03 "
Potassium	6.8 "	5.3 "
Chromium (total)	0.06 "	0.02 "
Manganese	0.23 "	0.23 "
Lead	0.02 "	0.04 "
Nickel	0.20 "	0.08 "
Zinc	0.03 "	0.09 "
Sodium	68 "	40 "
Arsenic	less than 1 µg/l	8 ug/l

Most of these changes are not significant but the one for total chromium is interesting because Simmons Co., the only industry upstream of this sampling station, discharges chromium as part of their wastes.

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 8

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

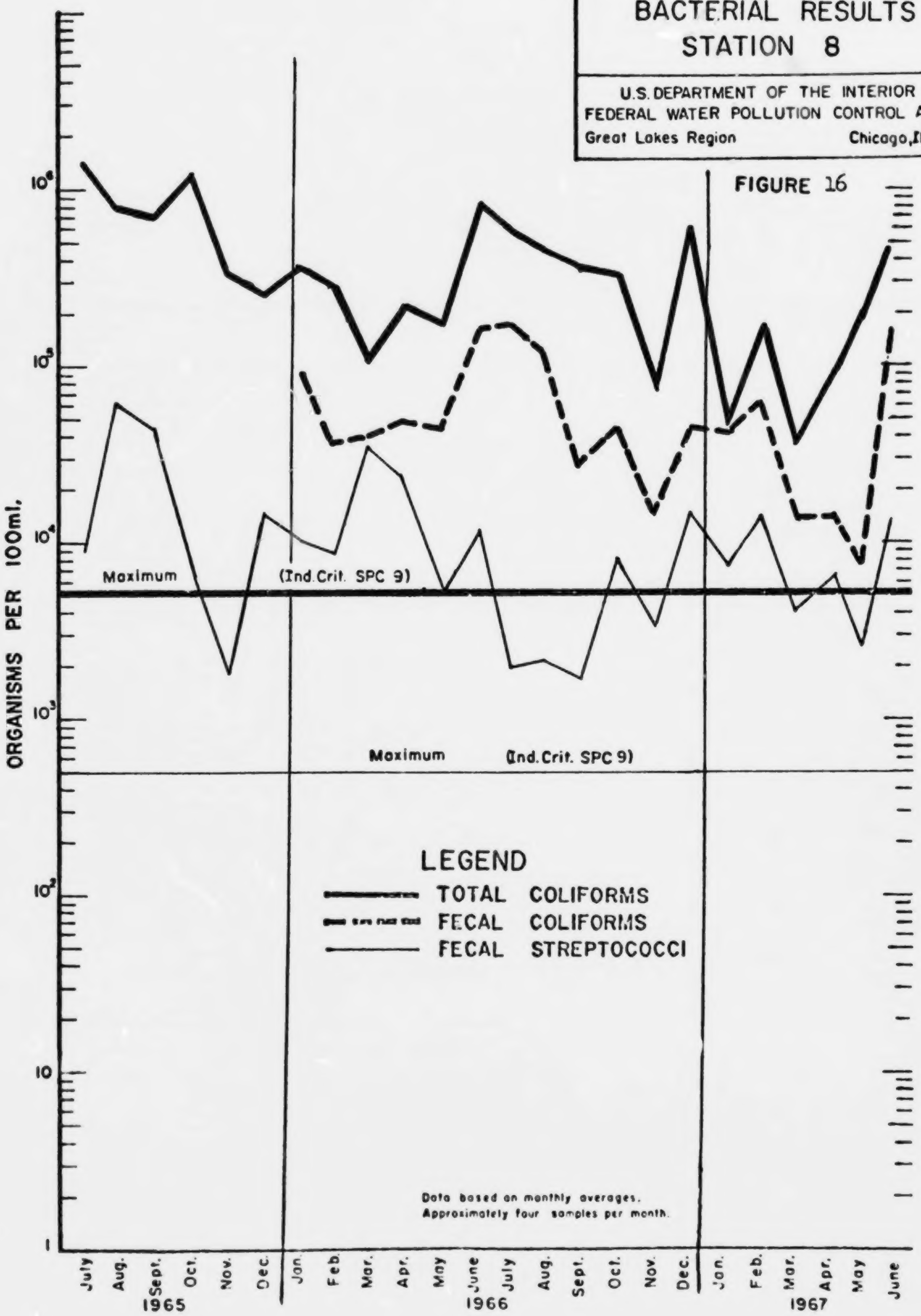
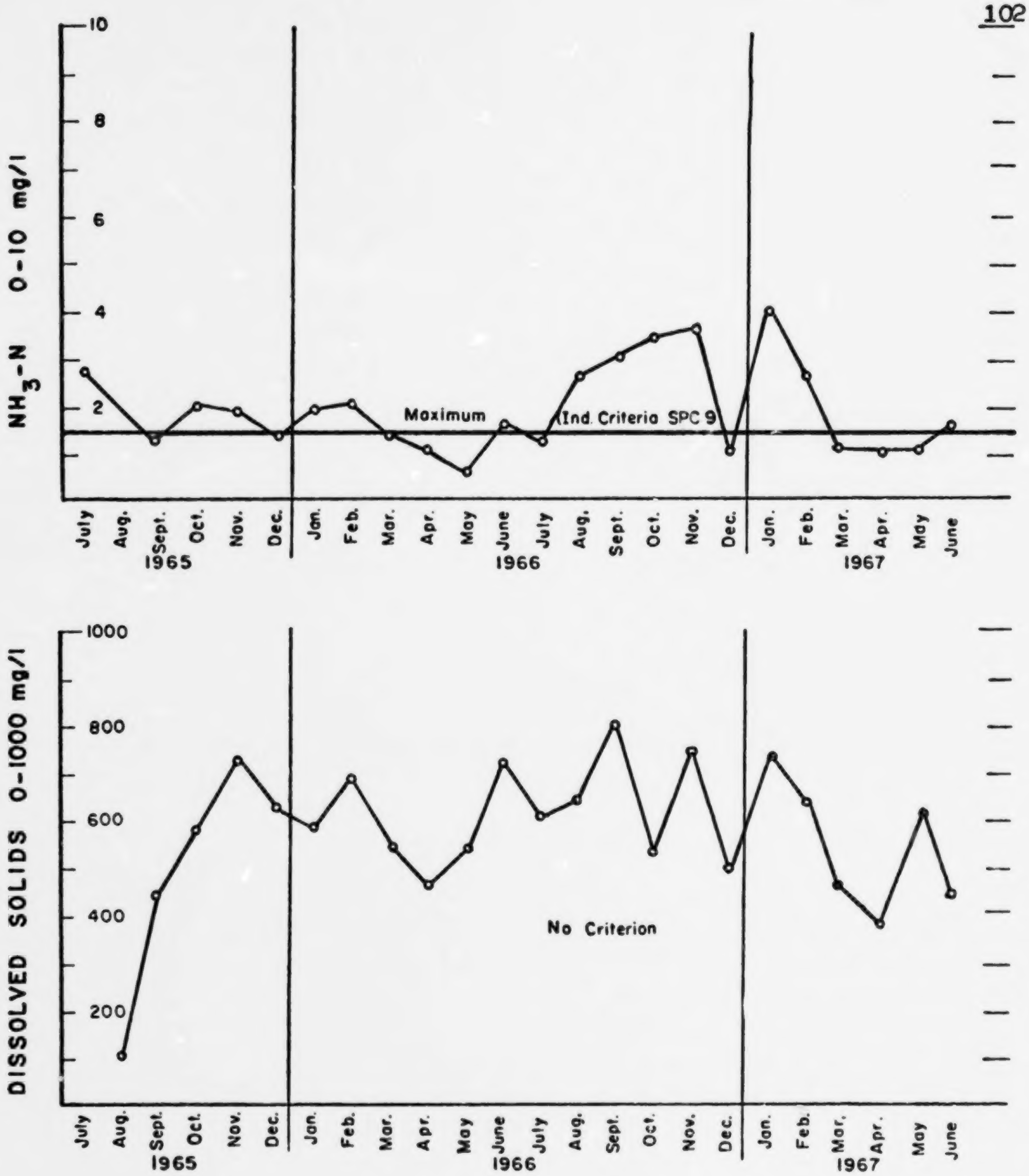


FIGURE 16

Data based on monthly averages.
Approximately four samples per month.



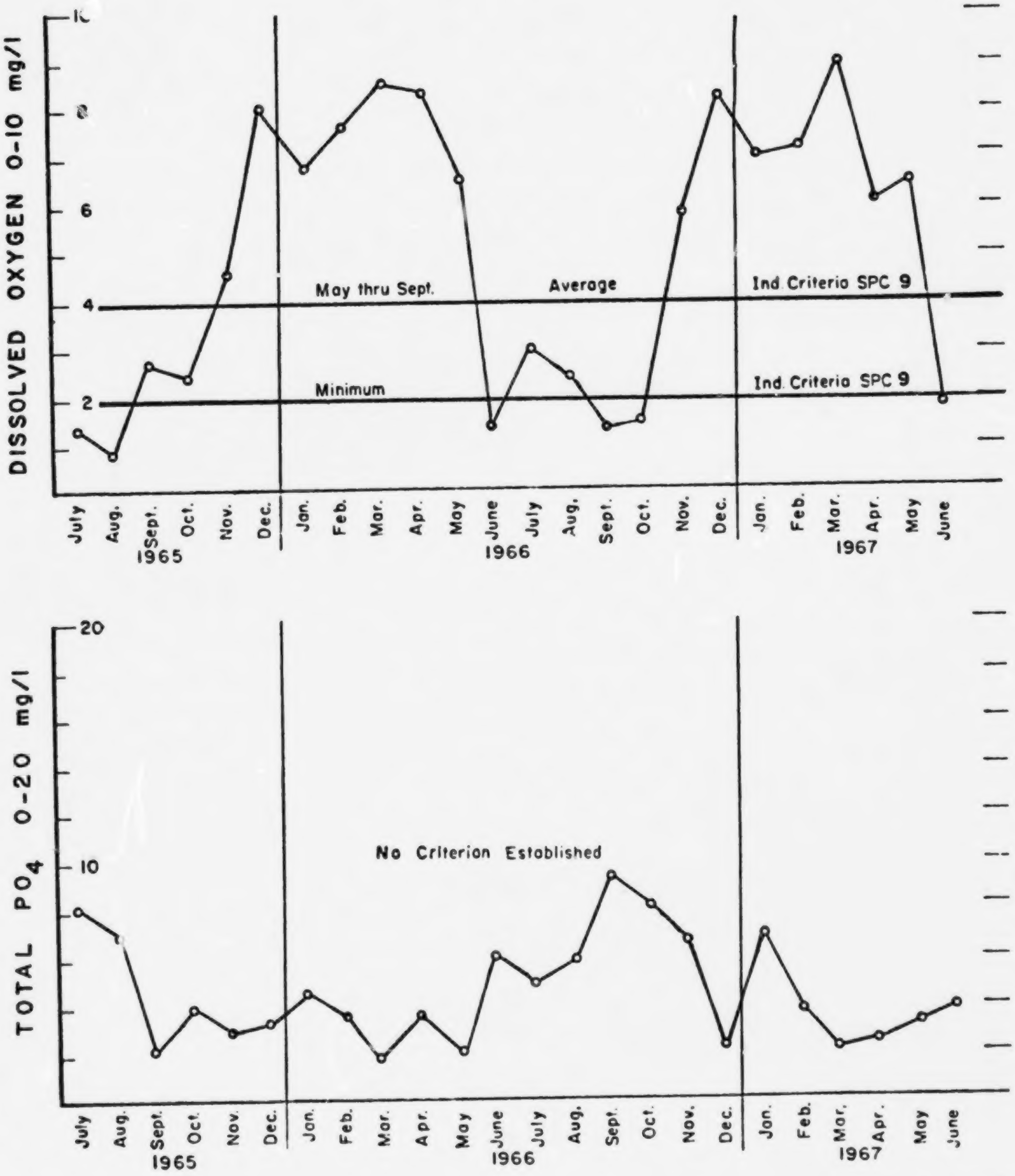
CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 8
Little Calumet River
at Wentworth Avenue Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

Data based on monthly averages.
Approximately four samples per month.

FIGURE 17



Data based on monthly averages.
Approximately four samples per month.

FIGURE 18

CALUMET AREA SURVEILLANCE PROJECT

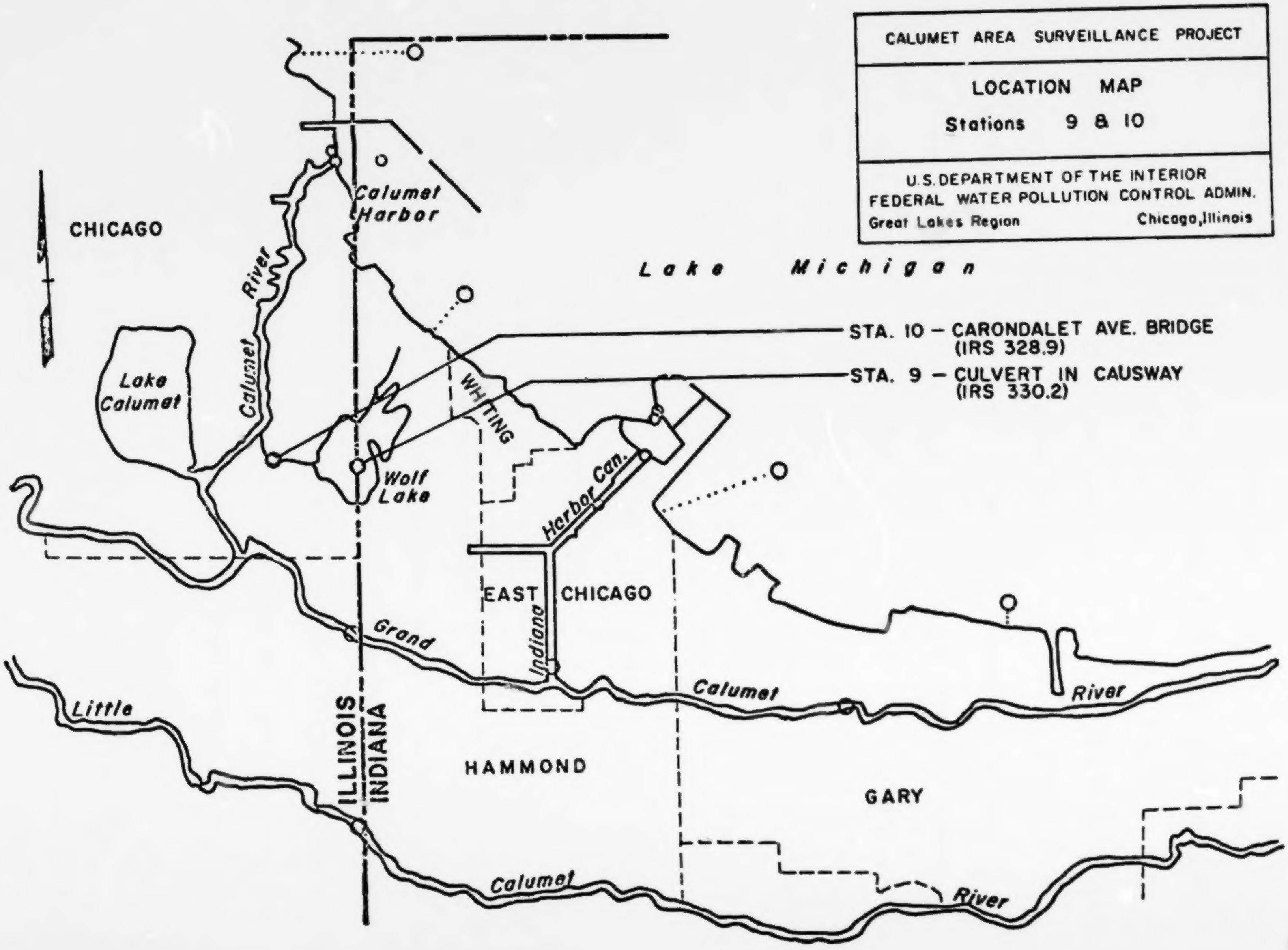
CHEMICAL RESULTS
STATION 8
Little Calumet River at
Wentworth Avenue Bridge

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

TABLE 8

CHEMICAL QUALITY OF WATER
STATION 8 - LITTLE CALUMET RIVER AT WENTWORTH AVENUE- LC 332.3

Parameter		July 65 - June 66				July 66 - June 67				Standards Adopted by Conferees (Spc 9)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	24	0	11	10	30	0	11	9	32.3		
pH		8.8	7.0	-	7.4	8.1	6.7	-	7.2		Med.6.5-9.0	
Conductivity	umho/cm	1220	425	808	765	1360	345	925	960			
Alkalinity	mg/l	-	-	-	-	307	65	203	211			
DO	"	11.00	0.00	4.86	4.70	11.85	0.10	4.90	4.60		2.0	4.0
BOD	"	35.0	3.9	9.6	7.8	17.0	4.3	9.1	9.0	10		
COD	"	151	6	48	41	76	19	46	47			
Sulphates	"	310	57	181	178	480	30	204	202			
Chlorides	"	55	17	41	44	80	18	51	50			
MBAS	"	0.76	0.15	0.28	0.25	1.10	0.19	0.44	0.40	0.5		
NH_3-N	"	3.70	0.30	1.68	1.60	7.30	0.30	2.21	1.80	1.5		
NO_2+NO_3-N	"	5.40	0.04	1.69	1.50	9.30	0.10	1.85	1.30			
Org. N	"	6.23	0.13	2.14	1.50	7.2	0.3	1.74	1.6			
Sol PO_4	"	9.71	0.00	2.24	1.90	13.0	0.46	41	4.1			
Total PO_4	"	14.28	0.22	4.05	3.40	14.0	1.2	5.0	4.8			
Iron	"	3.80	0.44	1.13	0.91	32.00	0.28	2.11	0.95			
Cyanide	"	0.18	0.00	0.01	0.00	0.66	0.00	0.15	0.00	0.025		
Susp. Solids	"	980	10	97	31	856	5	65	28			
Dis. Solids	"	860	109	580	610	907	194	602	600			
Phenol	ug/l	59.0	0.0	11.7	9.0	65.0	0.3	10.3	7.0	20		
Turbidity	units	103.0	1.2	15.6	9.0	470.0	1.0	23.0	10.0			
		Data based on 50 samples				Data based on 51 samples						



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

Stations 9 & 10

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

STA. 10 – CARONDALET AVE. BRIDGE (IRS 328.9)

STA. 9 – CULVERT IN CAUSWAY (IRS 330.2)

Stations 9 and 10 - Wolf Lake and Outlet

Wolf Lake, which is located on the Indiana-Illinois State line, has been sampled at two points. Station 9 is directly on the State line, which runs along a causeway that bisects the lake. This station monitors the quality of the water crossing the State line and has been established as a control point by the Calumet Area Technical Committee. Station 10 is located on the Wolf Lake outlet at Carondolet Avenue about 3000 feet downstream from Wolf Lake and monitors the quality of the water leaving the lake.

The bacterial quality of Wolf Lake and its outlet was good. At the State line bacterial counts met the criteria on all occasions during the first six months of 1967. This is shown on Figure 19, page 56. The outlet met the criteria on all but one occasion in June when there was a heavy rainfall on the sampling day. This is shown on Figure 20, page 57. The beach at 121st Street in Hammond has been sampled twice each week since May 18, 1967, for bacterial quality, as was indicated on Table B-1 on page 12. It met the criteria on all occasions.

The dissolved oxygen concentration in the lake and its outlet was adequate for all uses. The minimum, as Tables 9 and 10, pages 60 and 61 indicate, found in the lake over the past two years was 7.1 mg/l and 5.9 mg/l in the outlet.

Foam was observed on the lake on several occasions. Analyses of this foam revealed that the MBAS concentration was no more than that of the surrounding water and was far below the amount to cause foaming. It was concluded, therefore, that the foam was due to natural causes. Figures 21 and 22 show the concentrations of MBAS and phosphates.

The concentrations of ammonia and phosphates in the lake were above the standards.

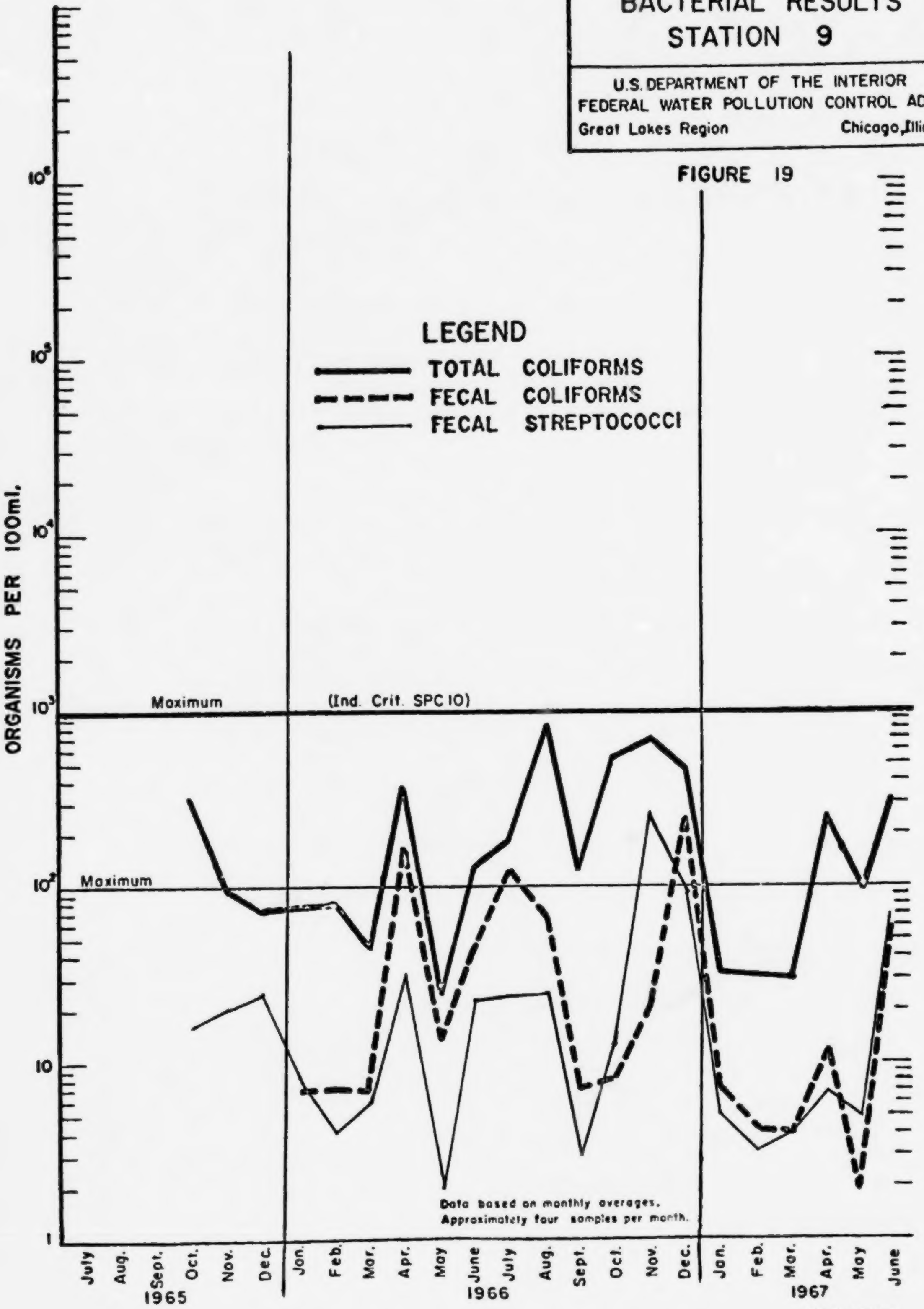
On May 16, 1967, the concentration of phenolic compounds in the lake increased from its normal level of less than 5 µg/l to 57 µg/l and did not subside until June. On May 31, 1967, a discharge of dark brown material was observed coming from an outfall just south of the Indianapolis Boulevard bridge over Wolf Lake. The outfall was sampled and 74 µg/l of phenol compounds were found. The source of this discharge is being investigated.

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 9

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 19



Data based on monthly averages.
Approximately four samples per month.

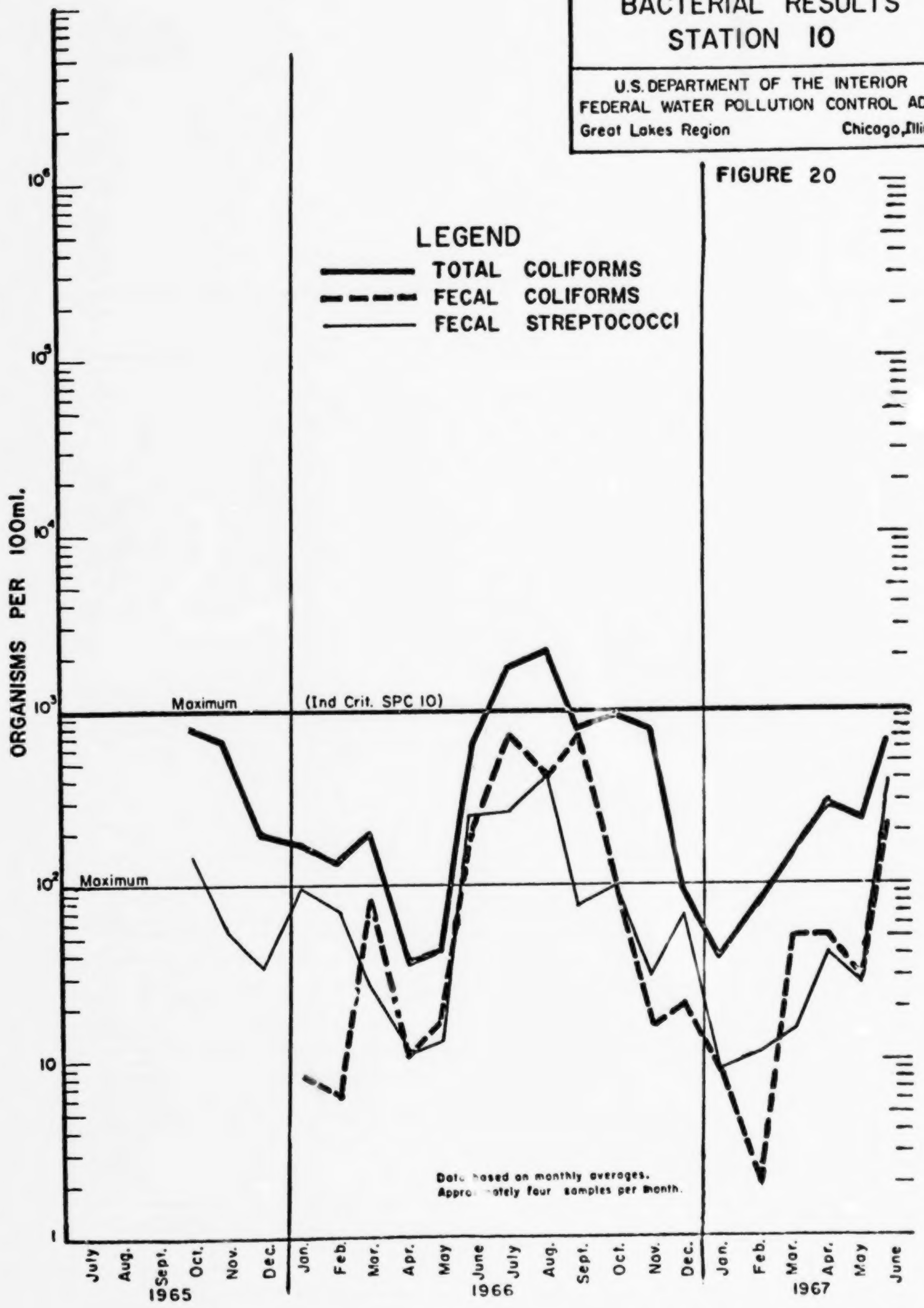
GPO 804-863-6

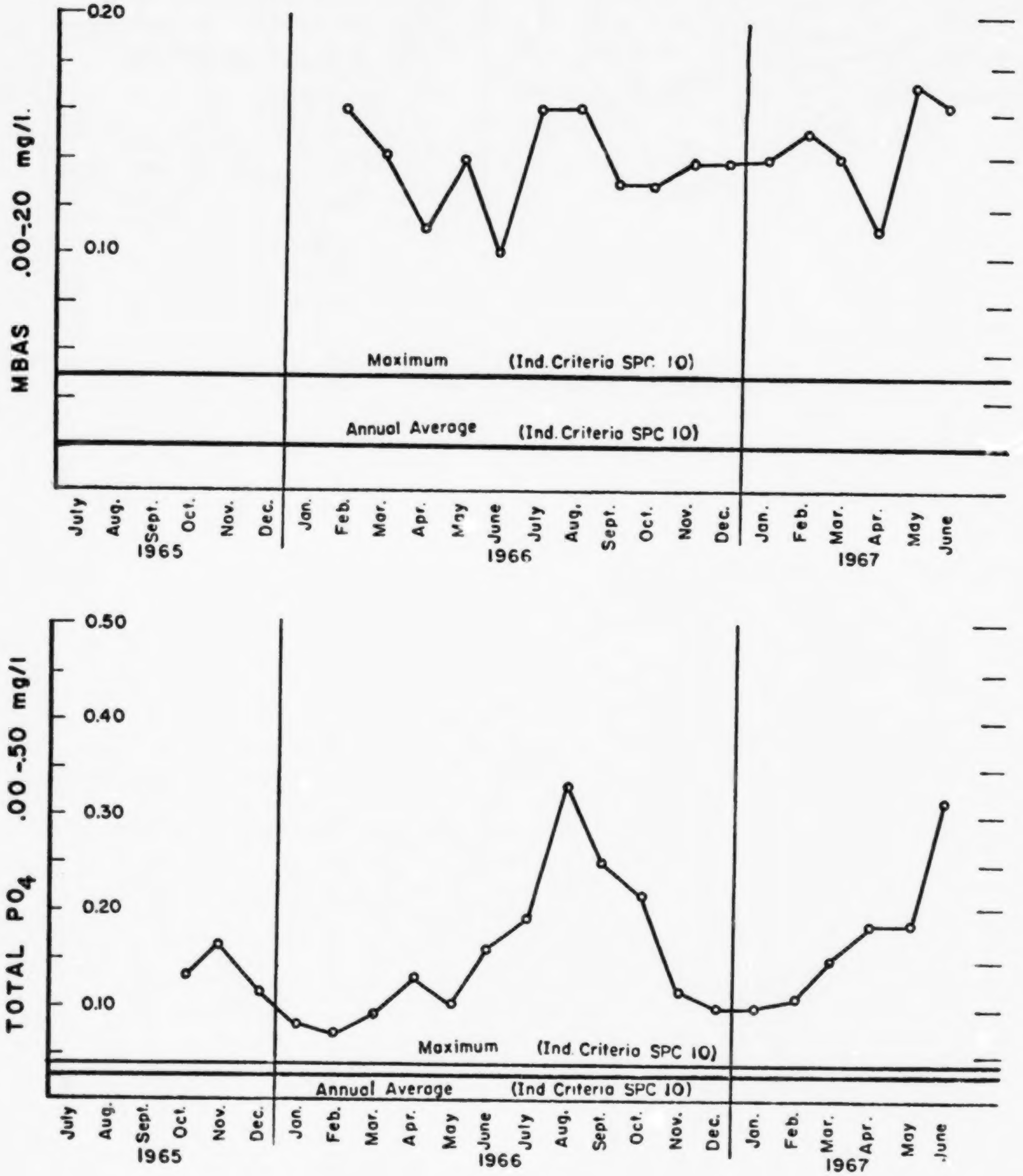
CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS STATION 10

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 20





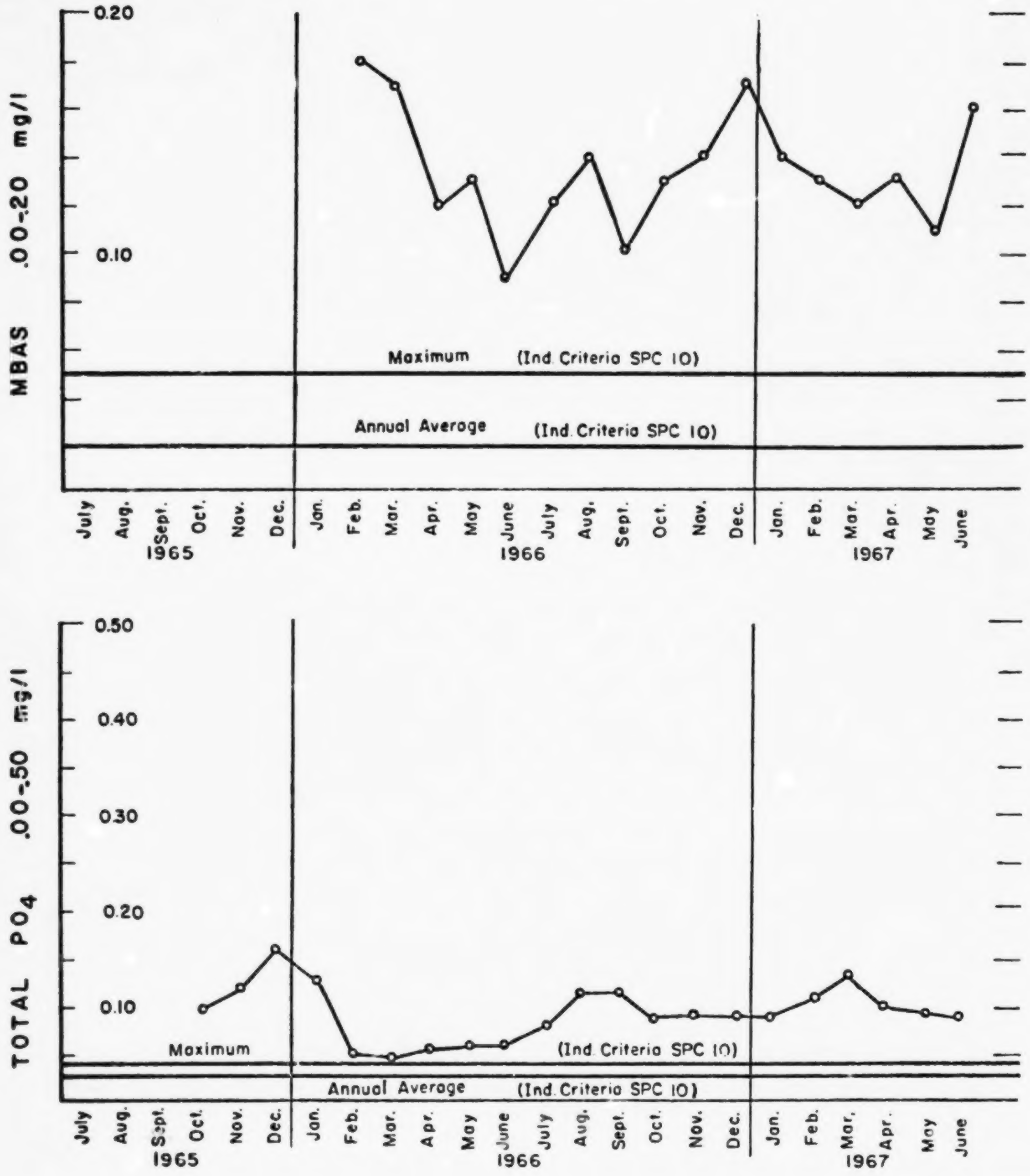
Data based on monthly averages.
Approximately four samples per month.

FIGURE 21

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 9
Wolf Lake
at State Line

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois



Data based on monthly averages.
Approximately four samples per month.

FIGURE 22

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 10
Wolf Lake Outlet
at Carondolet Avenue

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

TABLE 9

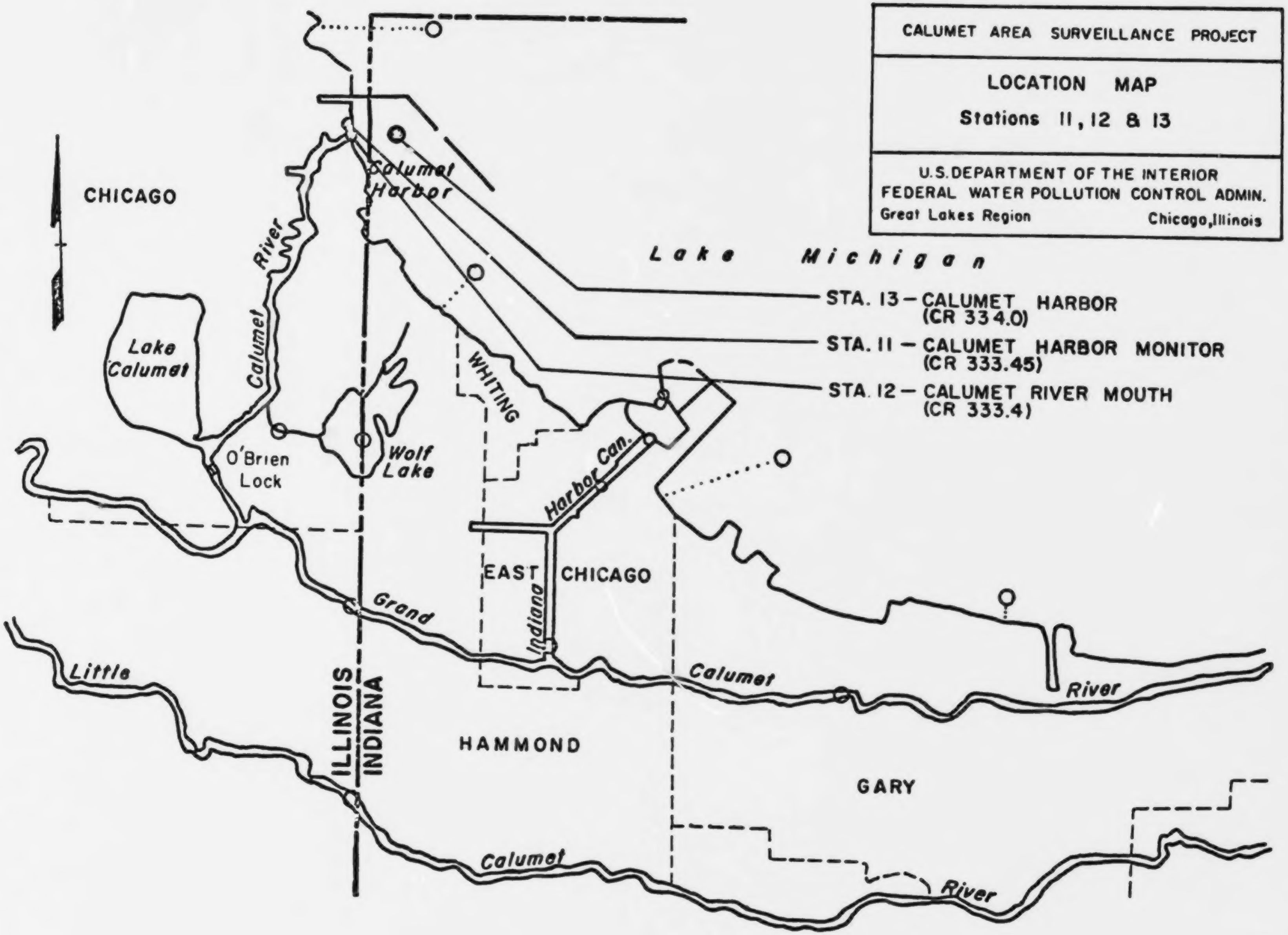
CHEMICAL QUALITY OF WATER
STATION 9 - WOLF LAKE AT CULVERT ON INDIANA-ILLINOIS STATE LINE-IRS 330.2

Parameter		October 65 - June 66				July 66 - June 67				Standards Adopted by Indiana (Spc 10)		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	24	0	7	4	29	0	10	9	29.4	-	-
pH		9.8	7.5	-	8.0	9.6	6.9	-	7.8		Med.7.0-9.0	
Conductivity	umho/cm	460	350	414	400	510	335	406	395			
Alkalinity	mg/1	-	-	-	-	450	69	128	116			
DO	"	15.0	7.7	11.5	11.8	14.20	7.10	10.45	10.52		80% Sat.	90% Sat.
BOD	"	7.8	1.2	3.7	3.5	11.0	1.6	4.9	4.5			
COD	"	134.0	6.4	25.1	19.0	55	15	29	26			
Sulphates	"	69	45	54	54	70	22	48.8	48			
Chlorides	"	38	27	31	30	38	20	28.9	28			
MBAS	"	0.19	0.10	0.12	0.11	0.30	0.07	0.14	0.12	0.05		0.02
NH_3-N	"	0.56	0.02	0.27	0.26	0.73	0.03	0.25	0.25	0.12		0.05
NO_2+NO_3-N	"	1.20	0.03	0.44	0.39	0.99	0.02	0.31	0.29			
Org. N	"	1.19	0.45	0.74	0.70	2.0	0.55	1.1	1.0			
Sol PO_4	"	0.29	0.00	0.04	0.03	0.36	0.05	0.12	0.10			
Total PO_4	"	0.34	0.04	0.12	0.11	0.48	0.07	0.18	0.17	0.04		0.03
Iron	"	0.97	0.04	0.25	0.22	1.6	0.05	0.33	0.25			
Cyanide	"	0.35	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.025		
Susp. Solids	"	51	2	12	9	65	2	15	14			
Dis. Solids	"	320	180	267	265	342	184	246	244			
Phenol	ug/1	20	0	3	3	57	0	5.7	3			
Turbidity	units	4.2	0.5	2.3	2.1	16	1.3	5.5	5.5			
		Data based on 37 samples				Data based on 51 samples						

TABLE 10

CHEMICAL QUALITY OF WATER
STATION 10 - WOLF LAKE CHANNEL AT CARONDOLET AVE.-IRS 328.9

Parameter		October 65 - June 66				July 66 - June 67				Standards Indiana	Adopted by for Wolf L.	
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	25	0	7	4	28	0	11	10	29.4	-	-
pH		8.8	7.9	-	8.4	8.8	7.7	-	8.3		Med.7.0-9.0	
Conductivity	umho/cm	545	370	463	460	550	340	437	425			
Alkalinity	mg/1	-	-	-	-	138	79	107	105			
DO	"	14.0	5.9	10.8	11.4	13.95	5.95	10.02	10.00		80%Sat	90%Sat.
BOD	"	5.0	1.7	2.8	2.6	7.6	1.9	3.3	3.2			
COD	"	138.0	0.8	22.0	18.0	38	11	24.8	25			
Sulphates	"	92	45	73	74	82	32	66.2	68			
Chlorides	"	37	30	34	35	42	21	33.8	34			
MBAS	"	0.24	0.09	0.13	0.12	.35	.08	.13	.12	0.05		0.02
NH_3-N	"	0.67	0.06	0.25	0.25	.78	.01	.22	.19	0.12		0.05
NO_2+NO_3-N	"	0.67	0.10	0.35	0.32	.97	.01	.28	.26			
Org. N	"	1.11	0.35	0.66	0.61	1.05	0.28	0.70	0.70			
Sol PO_4	"	0.24	0.00	0.05	0.03	0.15	0.02	0.07	0.07			
Total PO_4	"	0.49	0.03	0.09	0.06	0.29	0.06	0.09	0.09	0.04		0.03
Iron	"	0.77	0.04	0.22	0.22	.54	.04	.32	.20			
Cyanide	"	0.02	0.00	0.00	0.00	.01	.00	.00	.00	0.025		
Susp. Solids	"	65	2	21	19	58	2	16.6	15			
Dis. Solids	"	315	245	287	290	343	172	268	270			
Phenol	ug/1	15	0	6	7	30	1	8.7	8			
		Data based on 37 samples				Data based on 51 samples						


CALUMET AREA SURVEILLANCE PROJECT
LOCATION MAP
Stations 11, 12 & 13
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region
Chicago, Illinois
Lake Michigan
STA. 13 — CALUMET HARBOR (CR 334.0)
STA. 11 — CALUMET HARBOR MONITOR (CR 333.45)
STA. 12 — CALUMET RIVER MOUTH (CR 333.4)
CHICAGO
Calumet Harbor
Calumet River
Lake Calumet
O'Brien Lock
Wolf Lake
WHITING
Harbor Can.
EAST CHICAGO
Indiana
Grand Calumet River
Little Calumet River
ILLINOIS
INDIANA
HAMMOND
GARY

Stations 11, 12 and 13 - Calumet Harbor

Calumet Harbor was sampled at three points. Station 11 is located at the mouth of the Calumet River immediately adjacent to the north pierhead light. Station 12 is located at the mouth of the Calumet River at midstream. The purpose of these stations is to monitor the quality of the water entering the river from the harbor. Station 13 is located in mid-harbor approximately 3500 feet from the mouth of the river. This station monitors the quality of the water flowing from Lake Michigan to the river. Stations 12 and 13 require a boat for sampling and therefore can be sampled only when weather permits. A comparison of the data from Stations 11 and 12 revealed that they are essentially the same in terms of water quality. Sampling at Station 12 has, therefore, been discontinued as of July 1967.

Operation of the O'Brien Lock shown on the location map for Stations 11, 12 and 13, page 62, tends to isolate the lower end of the Calumet River by reversing the natural flow of the river. Under these conditions water flows from the lake to the river most of the time. For this reason it can be stated that most of the pollution in the harbor and at the river mouth originates in the immediate area.

Figures 23, 24 and 25, on pages 64, 65 and 66, show that the bacterial quality in this area is generally satisfactory. No criteria have been established specifically for the harbor but the criteria for Lake Michigan Inner Harbor Basins can reasonably be applied and are used for comparison purposes. At Stations 11 and 12 the maximum of 5000 total coliforms per 100 ml was exceeded on only one occasion during the first six months of 1967 and the arithmetic average of 1500 per 100 ml is within the allowable limit. The criteria for fecal streptococci (100 per 100 ml) was violated approximately 25% of the time. This indicates that whatever pollution is present is fresh in nature. The only known sources of human wastes are ships using the harbor.

The major industrial pollution problem in the area is iron discharged by the U. S. Steel Corporation's South Works, which often discolors the entire area. Phenols were generally within the limit set by the criteria (50 µg/l) except for a period in January and February when they were high for a two-week period. Except for ammonia nitrogen, all of the other criteria were met. Concentrations of these and other parameters measured at Stations 11, 12 and 13 are shown on Figures 26 and 27 and Tables 11, 12 and 13 on pages 69 through 71.

Samples from Station 11 were composited on a monthly basis and analyzed for heavy metals. The following table gives the average values for the first six months of 1967.

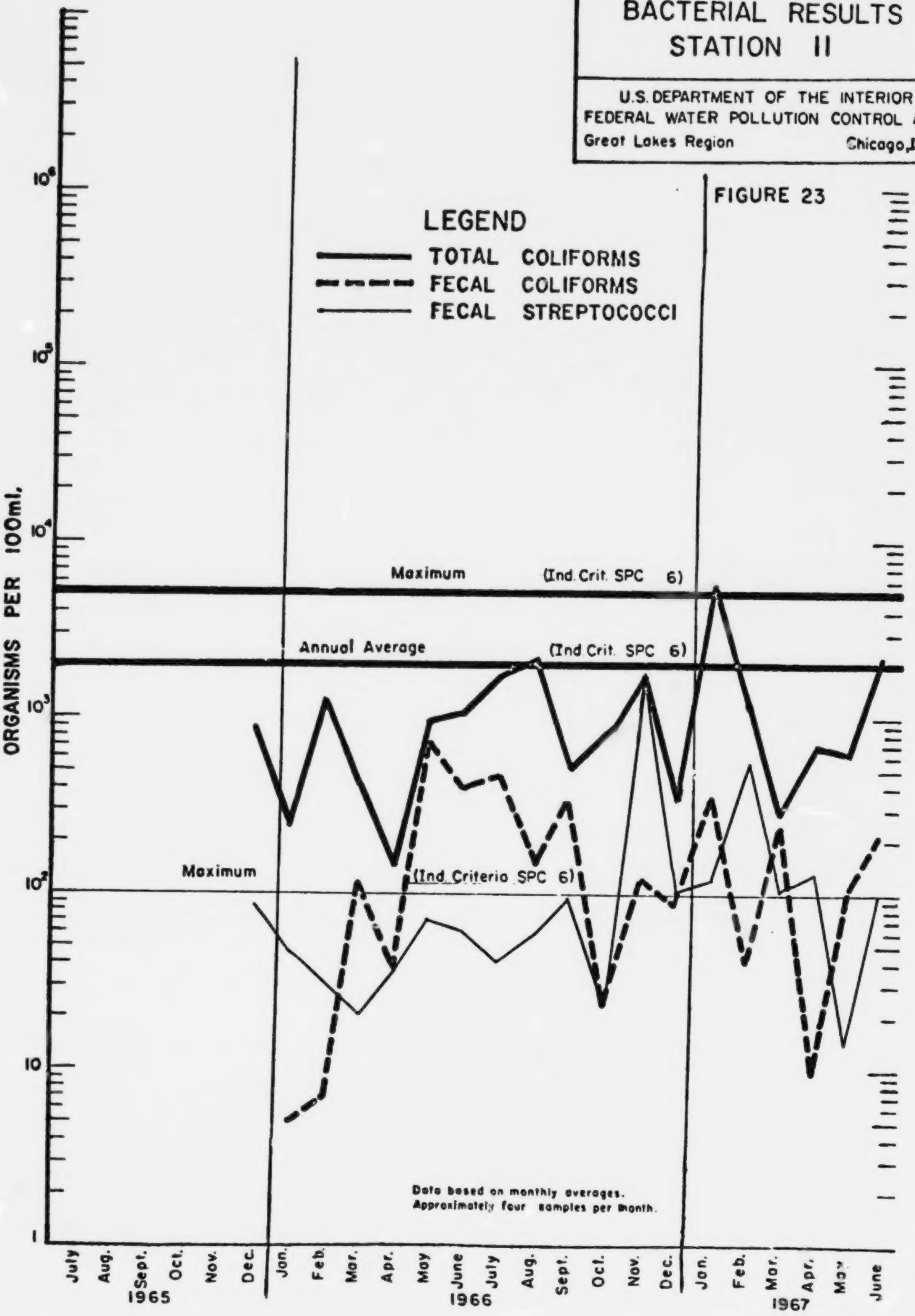
Cadmium	less than	0.005	mg/l
Copper		0.04	"
Potassium		3.9	"
Chrome	less than	0.005	"
Manganese		0.22	"
Lead		0.04	"
Nickel		0.03	"
Zinc		0.09	"
Sodium		8	"
Arsenic		6	µg/l

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 11

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 23



Data based on monthly averages.
Approximately four samples per month.

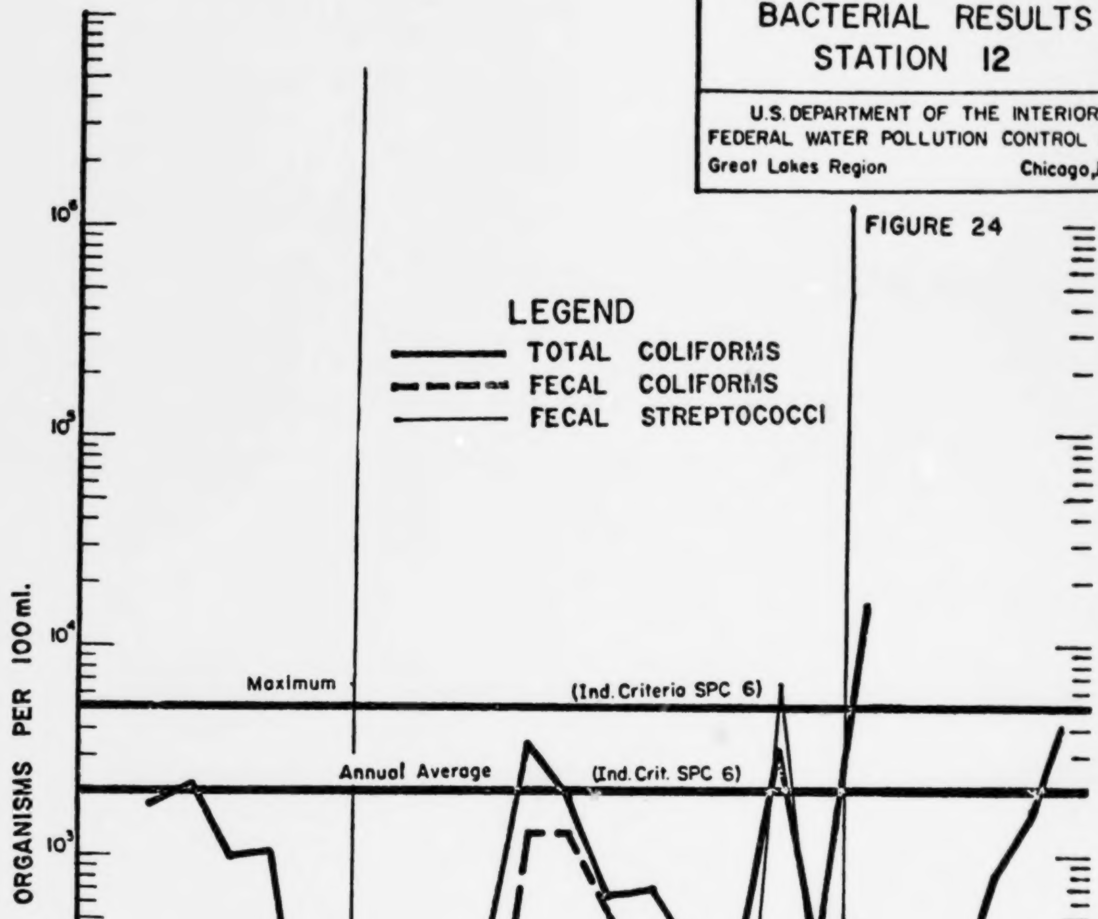
GPO 804-863-5

CALUMET AREA SURVEILLANCE PROJECT

BACTERIAL RESULTS
STATION 12

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 24



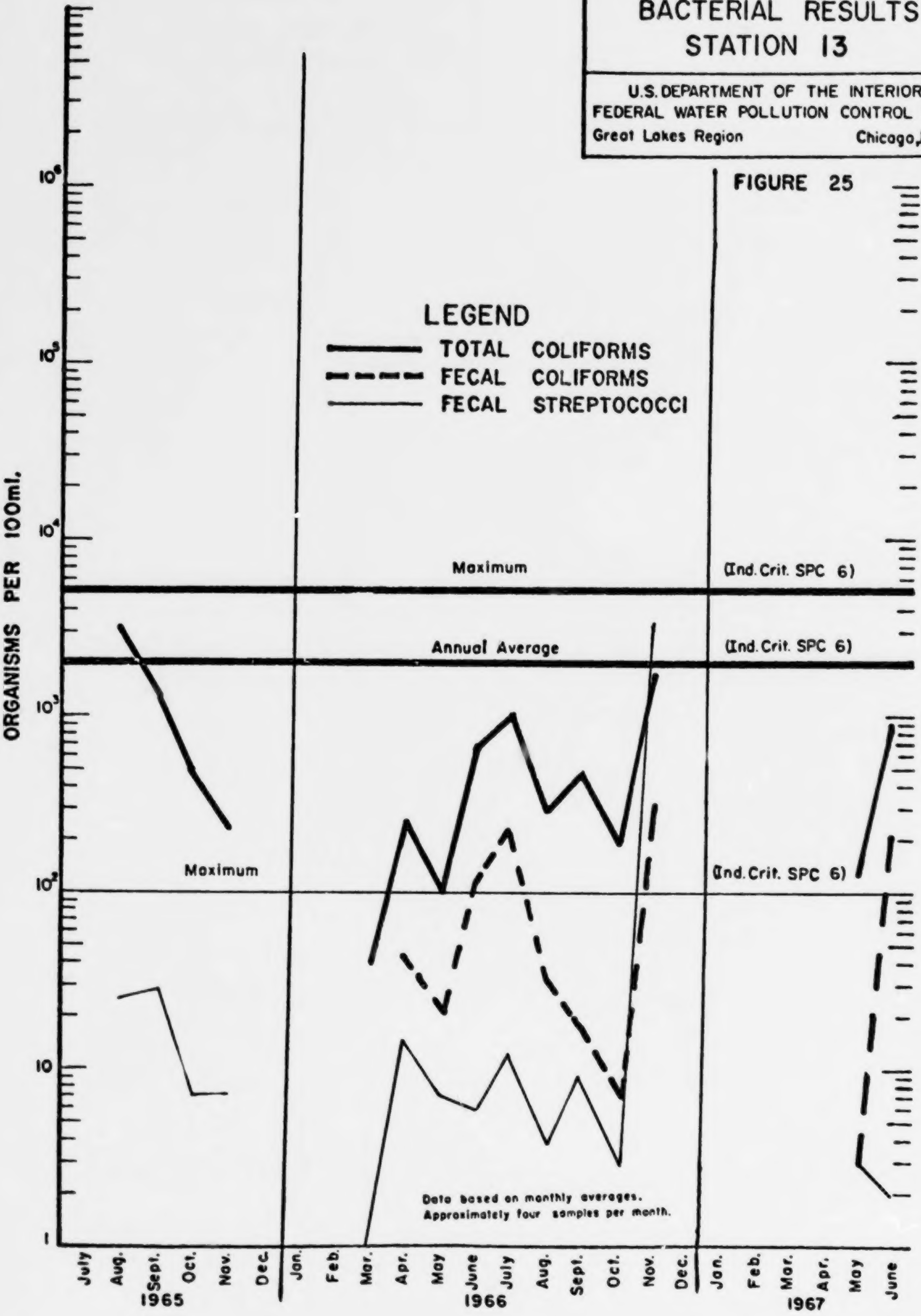
Data based on monthly averages.
Approximately four samples per month.

CALUMET AREA SURVEILLANCE PROJECT

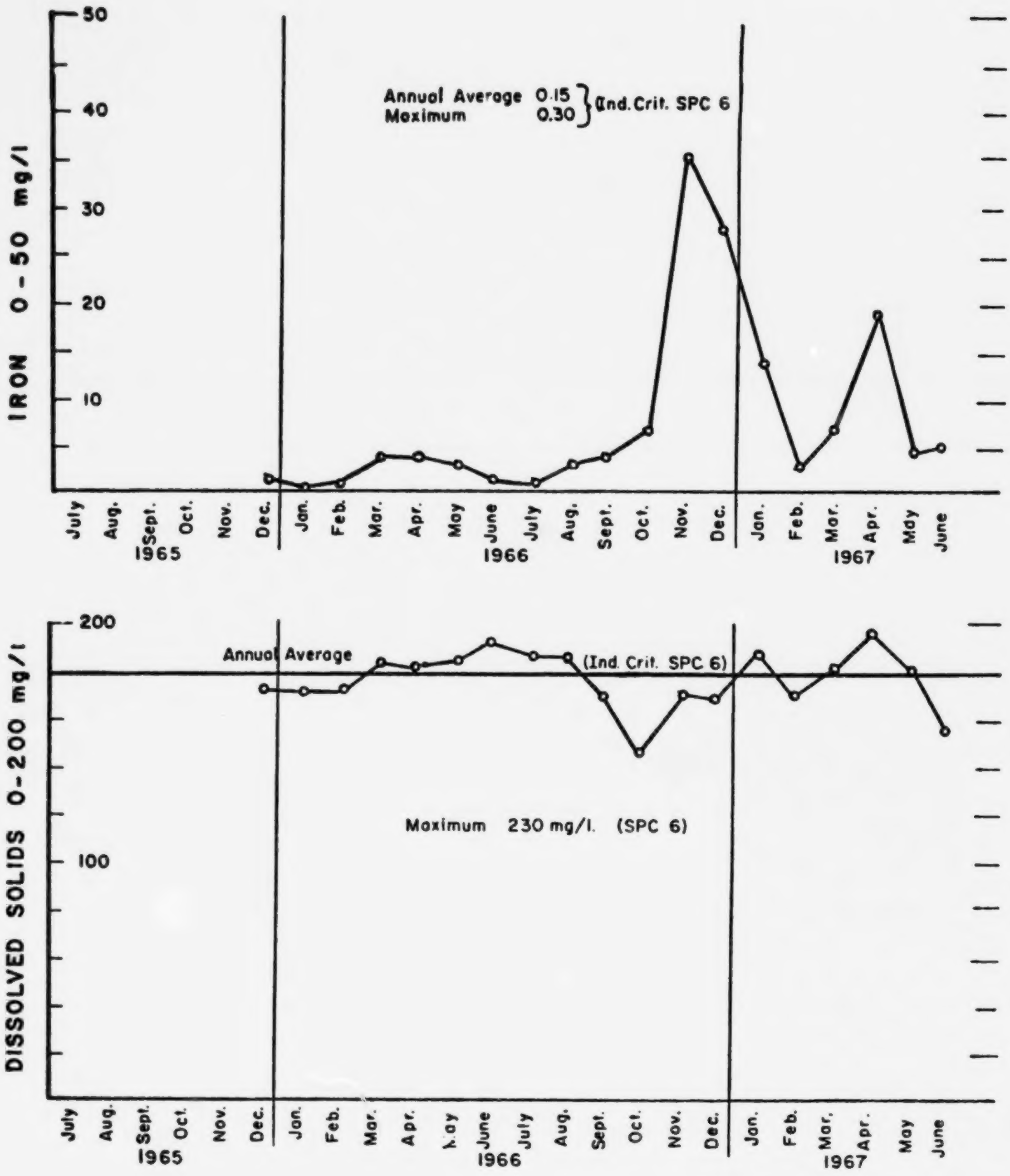
BACTERIAL RESULTS
STATION 13

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 25



Data based on monthly averages. Approximately four samples per month.



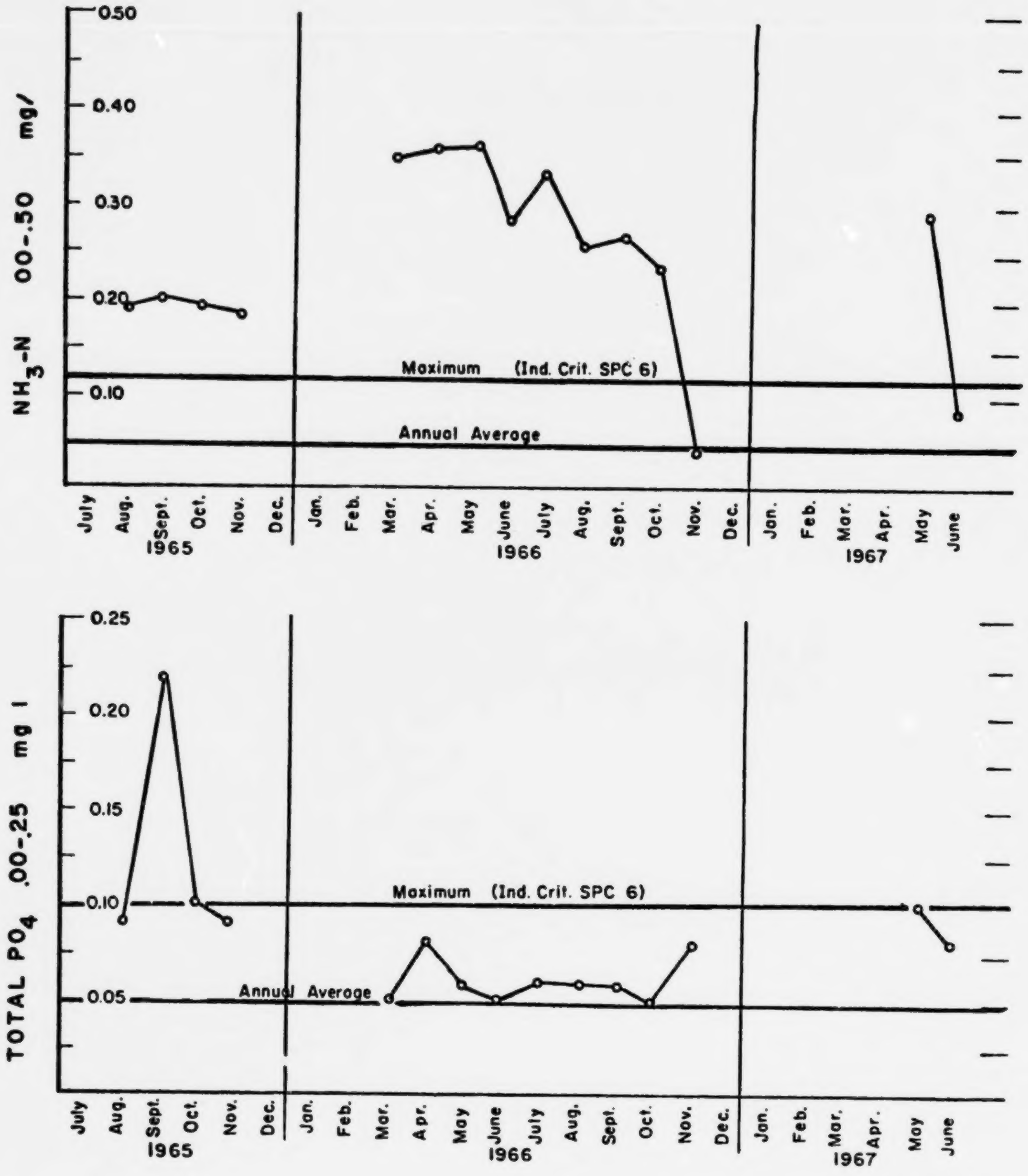
Data based on monthly averages.
Approximately four samples per month.

FIGURE 26

CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 11
Calumet Harbor
North Pierhead Light

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois



CALUMET AREA SURVEILLANCE PROJECT

CHEMICAL RESULTS
STATION 13
Calumet Harbor

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

Data based on monthly averages.
Approximately four samples per month.

FIGURE 27

TABLE 11

CHEMICAL QUALITY OF WATER
STATION 11 - CALUMET RIVER AT NORTH PIERHEAD LIGHT-CR 333.45
(WATER QUALITY MONITORING STATION)

Parameter		January 66 - June 66				July 66 - June 67				Standards Adopted by Indiana for L. Mich. Shore Waters		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	19	0	7	6	26	0	11.7	9	29.4	-	-
pH		8.3	7.4	-	7.8	8.3	7.1	-	7.9		Med.7.0-9.0	
Conductivity	umho/cm	330	203	298	300	440	250	317	310			
Alkalinity	mg/l	-	-	-	-	133	88	108	106			
DO	"	14.1	4.2	10.1	10.4	13.40	2.75	8.37	8.70		80% Sat.	90% Sat.
BOD	"	4.9	0.9	2.5	2.2	5.60	1.1	3.8	2.5			
COD	"	36	0.7	9.5	8.8	42	5	16	13			
Sulphates	"	35	21	27	27	58	9	28.7	29			
Chlorides	"	16	10	12	12	33	7	14.4	12			
MBAS	"	.22	.03	.07	.05	.32	.02	0.08	0.08	0.05		0.02
NH_3-N	"	0.72	0.21	0.49	0.46	4.4	.12	0.60	0.37	0.12		0.05
NO_2+NO_3-N	"	0.32	0.09	0.20	0.22	0.78	0.03	0.28	0.24			
Org. N	"	0.70	0.05	0.34	0.31	1.00	0.03	0.37	0.35			
Sol PO_4	"	0.78	0.00	0.11	0.04	0.79	0.01	0.06	0.04			
Total PO_4	"	0.90	0.04	0.17	0.09	1.10	0.03	0.16	0.16	0.04		0.03
Iron	"	8.6	0.1	2.1	1.1	97.0	0.69	10.7	3.1			
Cyanide	"	0.13	0.00	0.02	0.01	0.08	0.00	0.005	0.2	0.025		
Susp. Solids	"	85	8	29	23	239	3	40	22			
Dis. Solids	"	210	160	182	185	252	80	180	180			
Phenol	ug/l	15	0.6	2.9	2.7	131	0.0	10.0	5.0	50		
Turbidity	units	-	-	-	-	90.0	0.6	25.0	12.5			
		Data based on 25 samples				Data based on 52 samples						

TABLE 12

CHEMICAL QUALITY OF WATER
STATION 12 - CALUMET RIVER AT MOUTH - PIERHEAD LIGHTS—CR 333.4

Parameter		August 65 - June 66				July 66 - June 67				Standards Adopted by Indiana for L. Mich. Shore Waters		
		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	22	3	12	13	24	1	15.4	15.0	29.4		
pH		8.1	7.5	-	7.9	8.05	7.2	7.9	7.9		Med.7.0-9.0	
Conductivity	umho/cm	330	285	300	295	400	255	307	305			
Alkalinity	mg/l	117	110	113	113	211	90	112	109			
DO	"	13.00	5.40	8.64	8.50	12.40	1.60	7.80	7.95		80% Sat	90% Sat.
BOD	"	5.5	1.0	2.3	2.2	28	0.4	3.17	2.0			
COD	"	120.0	0.9	20.2	11.0	39	7	11.6	12.0			
Sulphates	"	30	17	24	24	47	16	26.8	26.0			
Chlorides	"	16	9	12	12	28	9	13.1	12.			
MBAS	"	0.10	0.03	0.06	0.05	0.16	0.03	0.08	0.08	0.05		0.02
NH_3-N	"	0.68	0.15	0.34	0.35	1.4	0.08	0.42	0.33	0.12		0.05
NO_2+NO_3-N	"	0.41	0.09	0.22	0.23	0.96	0.09	0.33	0.28			
Org. N	"	3.23	0.04	0.39	0.29	0.52	0.01	0.30	0.30			
Sol PO_4	"	0.23	0.01	0.06	0.04	0.11	0.01	0.05	0.04			
Total PO_4	"	0.25	0.02	0.10	0.08	0.23	0.04	0.11	0.09	0.04		0.03
Iron	"	2.30	0.24	0.96	0.86	11.0	0.44	2.35	2.0			
Cyanide	"	0.12	0.00	0.00	0.00	0.01	0.0	0.0	0.0	0.025		
Susp. Solids	"	76	2	20	18	88	6	21.9	14.0			
Dis. Solids	"	280	140	186	185	241	155	180	173			
Phenol	ug/l	12.0	0.0	2.1	1.0	12.0	0	3.1	3.0	50		
		Data based on 28 samples				Data based on 27 samples						

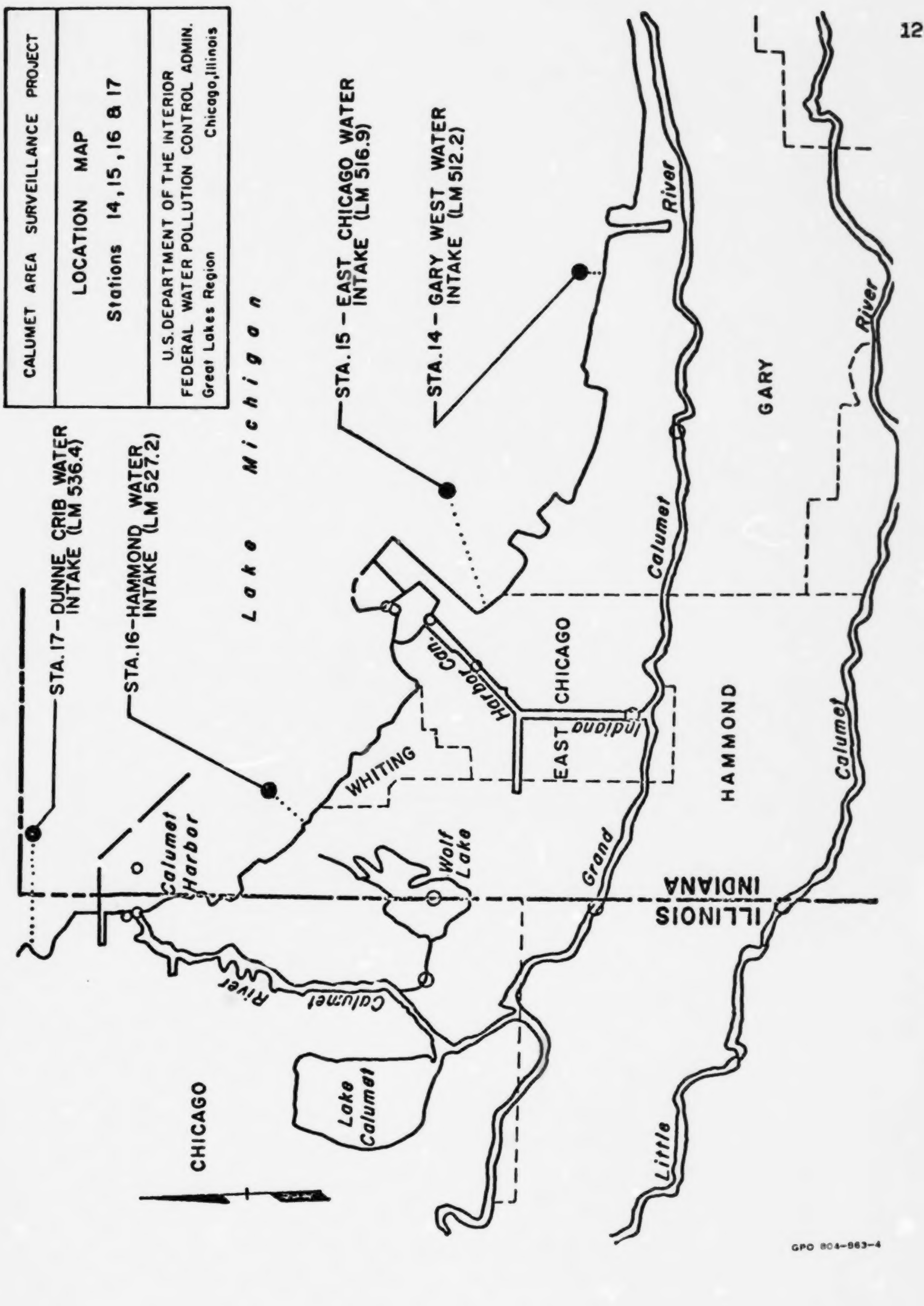
NOTE: This station was not sampled during the winter of 1965-66.

TABLE 13

CHEMICAL QUALITY OF WATER
STATION 13 - CALUMET HARBOR AT MID-CHANNEL-CR 334.0

		July 65 0 June 66				July 66 - June 67				Standards Adopted by Indiana for Inner Harbor Basin		
Parameter		Max.	Min.	Mean	Median	Max.	Min.	Mean	Median	Max.	Min.	Ave.
Water Temp.	°C	22	5	14	15	24	7	15.5	19	29.4	-	-
pH		8.1	7.4	-	7.9	8.15	7.45	7.9	7.8	9.0	7.5	Med. 8.0-8.5
Conductivity	umho/cm	310	270	293	300	315	260	294.5	300			
Alkalinity	mg/l	121	107	113	111	212	96	111.5	109			
DO	"	12.20	6.95	9.02	9.00	11.4	6.2	8.75	8.5	-	65% Sat.	80% Sat.
BOD	"	4.8	1.0	2.1	1.8	3.4	0.6	1.9	2.0			
COD	"	120.0	0.0	13.9	9.0	120	0.0	12.4	13			
Sulphates	"	37	18	24	24	37.0	16	25.3	25	75		35
Chlorides	"	14	8	11	11	15	9	11	10	30		16
MBAS	"	0.09	0.03	0.05	0.04	0.13	0.02	0.08	0.07	0.10		0.10
NH_3-N	"	0.48	0.10	0.26	0.25	0.47	0.04	0.25	0.25	0.12		0.05
NO_2+NO_3-N	"	0.53	0.08	0.22	0.21	0.40	0.04	0.24	0.19			
Org. N	"	0.56	0.03	0.31	0.36	0.52	0.06	0.31	0.26			
Sol PO_4	"	0.29	0.00	0.05	0.05	0.08	0.01	0.04	0.04			
Total PO_4	"	0.78	0.02	0.10	0.06	0.11	0.04	0.08	0.06	0.10		0.05
Iron	"	2.10	0.09	0.55	0.37	1.80	0.12	0.46	0.46	0.30		0.15
Cyanide	"	0.01	0.00	0.00	0.00	0.01	0.00	0.0	0.0	0.01		
Susp. Solids	"	46	1	11	8	23	2	8	7			
Dis. Solids	"	210	150	180	180	200	126	171	174	230		187
Phenol	ug/l	8.0	0.0	1.2	0.0	11	0	3.6	3.0	5		2
Turbidity	units	8.8	1.3	2.6	3.4	19.9	0.6	3.4	1.6			

NOTE: This station was not sampled during winter months. Data based on 22 samples



CALUMET AREA SURVEILLANCE PROJECT

LOCATION MAP

Stations 14, 15, 16 & 17

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

STA. 17 — DUNNE CRIB WATER INTAKE (LM 536.4)
STA. 16 — HAMMOND WATER INTAKE (LM 527.2)
STA. 15 — EAST CHICAGO WATER INTAKE (LM 516.9)
STA. 14 — GARY WEST WATER INTAKE (LM 512.2)
Lake Michigan
CHICAGO
Lake Calumet
Calumet River
Calumet Harbor
Wolf Lake
WHITING
EAST CHICAGO
Indiana Harbor Can.
HAMMOND
GARY
Grand Calumet River
Little Calumet River
ILLINOIS
INDIANA

GPO 804-983-4

Station 14 - Gary West Water Intake

The Gary West water intake is one of the control points designated by the Calumet Area Technical Committee for Lake Michigan open waters. The intake is located at a point remote from major sources of pollution and is exposed to the predominate clockwise current in the southern end of the lake. The water is of a high quality and should reflect the characteristics of the open waters of Lake Michigan.

The bacterial quality of the water was good during the first six months of 1967. The water quality standards for total coliforms (maximum 2500 per 100 ml; average 200 per 100 ml) was met on every occasion. The standards for fecal streptococci (maxium 25 per 100 ml) was met on all but four occasions.

As indicated on Table 14 on page 74 chemical quality of the water was also good although several criteria were not met. The criteria for ammonia and phosphates tentatively established by the Technical Committee were adopted as Water Quality Standards by the State of Indiana. The concentrations found in the lake at Station 14 exceed these standards.

The maximum sulphate and dissolved solids were within the range permitted by the standards but the averages were slightly above those required by the standards. The standards for iron and chloride were not met which may indicate that surface drainage from the U. S. Steel complex in Gary affected the lake during the period of heavy runoff.

In the previous report it was stated that the pH was consistently below the range required by the criteria. At that time samples were being taken into the laboratory to be tested for pH. It was believed that because the samples were iced and tested within a few hours of collection there would be no change in pH. Comparisons of laboratory results with field measurements on the same sample revealed that the pH measured in the field was 0.3 to 0.6 units higher than the laboratory pH. All pH values are now being measured in the field when the sample is collected.

TABLE 14

CHEMICAL QUALITY OF WATER
STATION 14 - GARY WEST WATER FILTRATION INTAKE-LM 512.2

		Recommended Criteria				Aug. 1966-June 1967			
Parameter		Max	Min	Mean	Median	Max	Min	Mean	Median
Water Temp.	°C	29.4				22	1	9	10
pH		9.0	7.7		8.1-8.4	8.5	7.1	-	7.9
Conductivity	umho/cm	-	-	-	-	335	240	287	290
Alkalinity	mg/l	-	-	-	-	120	90	106	107
DO	"	-	80% sat.	90% sat.	-	14.80	4.90	11.00	11.25
BOD	"	-	-	-	-	2.9	0.1	1.5	1.5
COD	"	-	-	-	-	22.0	2.0	10.7	10.0
Sulphates	"	50		23		37	16	24	23
Chlorides	"	15		8		26	7	11	10
MBAS	"	0.20		0.05		0.14	0.02	0.05	0.05
NH_3-N)	"	0.05*		0.02*		0.28	0.01	0.08	0.06
NO_2+NO_3-N)tot.N	"	0.04*				0.54	0.05	0.27	0.27
Org.N)	"					0.50	0.01	0.23	0.24
Sol PO_4	"	-	-	-	-	0.18	0.01	0.04	0.04
Total PO_4	"	0.04*		0.03*		0.24	0.02	0.08	0.06
Iron	"	0.30		0.15		3.9	0.05	0.57	0.35
Cyanide	"	0.025				0.01	0.00	0.00	0.00
Sus. Solids	"	-	-	-	-	149	3	18	10
Dis. Solids	"	200		162		215	112	175	172
Fluorides	"	1.3		1.0		0.40	0.12	0.29	0.32
Oil & Grease	"	Free from floating oil				4.8	0.0	0.8	0.5
Phenol	ug/l	3.0*		1.0*		5.0	0.0	1.4	1.0
Turbidity	units	No contrast with natural appearance				49.0	0.6	11.0	9.0
Color	"	15		5		20.0	0.0	3.5	3.5
Threshold Odor	"	8		4		60.0	1.5	6.1	315

*tentative

Data based on 48 samples

Stations 15 and 16 - East Chicago Water Intake and Hammond Water Intake

The East Chicago and the Hammond water intakes are the two control points designated by the Calumet Area Technical Committee for inner harbor basins. These control points have been adopted for the Indiana Water Quality Standards.

The East Chicago water intake (Station 15) is located east of the mouth of Indiana Harbor. It is often affected by wastes discharged from Indiana Harbor despite the prevailing northwesterly current. North and west winds often cause adverse currents which carry wastes to the intake.

Table 15 on page 77 compares the results for the period August 1966 through June 1967 with the Standards. The bacterial quality of the water is fairly good, although the standard for fecal streptococci was violated 24% of the time.

The dissolved oxygen concentration was sufficient for all water uses. Nitrogens and phosphates are far above levels designated by the Standards. Standards for parameters indicating domestic pollution (BOD, coliforms, MBAS, dissolved solids) were all met, but the criteria for parameters indicating industrial pollution (iron, phenol, ammonia) were not. This was consistent with the conditions found in Indiana Harbor and the Indiana Harbor Canal.

The Hammond water intake (Station 16) is located west of Indiana Harbor in the path of the prevailing current from the harbor. It is therefore much more seriously affected by wastes from the harbor. In addition it can be affected by combined sewer overflows which discharge to Lake Michigan in the vicinity.

During the last week of January and the entire month of February bacterial counts, turbidity and suspended solids were very high at Station 16. This indicates that combined sewer overflows to the lake resulted from the heavy snows during that period. The bacterial counts also rose sharply in June after a period of heavy rains.

Except for these higher bacterial counts the pattern was the same as at the East Chicago Water Intake (Station 15). As Table 16 on page 78 indicates the nutrients and industrial parameters (except cyanide) all violated the standards. Standards for MBAS, dissolved solids and dissolved oxygen were met.

The standard for cyanide (an industrial waste) was met at both stations 15 and 16 because, given time, cyanide breaks down in water and the time it takes for an individual slug of pollution to reach the intakes is considerable. This time is lengthened by the estuarial nature of the harbor and canal which causes considerable mixing, particularly during periods of northerly winds. At both stations the standards for threshold odor and turbidity were often violated while those for fluoride and true color were met.

The superintendents of both the East Chicago and the Hammond water filtration plants were informed of the heavy slug of phenol detected in the Indiana Harbor Canal on March 1, 1967. (See previous discussion on page 23.)

A special sampling run on March 2 failed to detect the slug but the threshold odor records of the plants reveal both had periods of higher than normal odors during the next few weeks. It is not possible to say whether or not the slug caused these odors, but it must certainly have been a contributing factor.

TABLE 15
CHEMICAL QUALITY OF WATER
STATION 15 - EAST CHICAGO WATER FILTRATION INTAKE-LM 516.9

		Recommended Criteria				Aug. 1966-June 1967			
Parameter		Max	Min	Mean	Median	Max	Min	Mean	Median
Water Temp.	°C	29.4				21	0	9	8
pH		9.0	7.5		8.0-8.5	8.4	7.4	-	7.8
Conductivity	µmho/cm	-	-	-	-	360	245	296	300
Alkalinity	mg/l	-	-	-	-	132	86	105	106
DO	"	-	65% sat.	80% sat.	-	17.05	8.30	14.29	13.90
BOD	"	-	-	-	-	6.0	0.2	1.8	1.7
COD	"	-	-	-	-	68	3	15	10
Sulphates	"	75		35		36	16	26	25
Chlorides	"	30		16		19	7	11	10
MBAS	"	0.30		0.10		0.16	0.01	0.06	0.06
NH_3-N	"	0.12*		0.05*		0.80	0.02	0.18	0.15
NO_2+NO_3-N	"	-	-	-	-	0.60	0.00	0.27	0.26
Org. N	"	-	-	-	-	1.19	0.05	0.32	0.29
Sol PO_4	"	-	-	-	-	0.07	0.01	0.05	0.04
Total PO_4	"	0.10*		0.05*		1.00	0.03	0.12	0.08
Iron	"	0.30		0.15		22.00	0.05	1.12	0.37
Cyanide	"	0.1				0.02	0.00	0.00	0.00
Sus. Solids	"	-	-	-	-	464	1	33	12
Dis. Solids	"	230		187		211	77	171	174
Fluorides	"	1.3		1.0		.50	.14	.29	.28
Oil & Grease	"	Free from floating oil				4.8	0.0	1.0	0.6
Phenol	ug/l	5.0*		2.0*		16	0	3	1
Turbidity	units	No contrast with natural appearance				160.0	0.6	13.0	8.0
Color	"	15		5		50	0	5	4
Threshold Odor	"	20*		8*		175.0	1.5	46.9	9.0

*tentative

Data based on 48 samples

TABLE 16

CHEMICAL QUALITY OF WATER
STATION 16 - HAMMOND WATER FILTRATION INTAKE-LM 527.2

Parameter		Recommended Criteria				Aug. 1966-June 1967			
		Max	Min	Mean	Median	Max	Min	Mean	Median
Water Temp.	°C	29.4				22	0	9	7
pH		9.0	7.5		8.0-8.5	8.1	7.2	-	7.8
Conductivity	umho/cm	-	-	-	-	345	245	296	300
Alkalinity	mg/l	-	-	-	-	119	80	106	107
DO	"	-	65% sat.	80% sat.	-	14.35	5.70	10.63	10.60
BOD	"	-	-	-	-	5.5	0.9	1.7	1.9
COD	"	-	-	-	-	32	2	13	13
Sulphates	"	75		35		38	13	25	26
Chlorides	"	30		16		20	8	11	10
MBAS	"	0.30		0.10		0.20	0.02	0.07	0.07
NH_3-N	"	0.12*		0.05*		0.38	0.03	0.17	0.16
NO_2+NO_3-N	"	-	-	-	-	0.76	0.05	0.31	0.26
Org. N	"	-	-	-	-	0.73	0.05	0.33	0.32
Sol PO_4	"	-	-	-	-	0.07	0.01	0.05	0.04
Total PO_4	"	0.10*		0.05*		0.32	0.03	0.10	0.09
Iron	"	0.30		0.15		5.90	0.04	0.78	0.52
Cyanide	"	0.1				0.02	0.00	0.00	0.00
Sus. Solids	"	-	-	-	-	202	2	24	13
Dis. Solids	"	230		187		275	87	174	173
Fluorides	"	1.3		1.0	-	0.46	0.16	0.27	0.28
Oil & Grease	"	Free from floating oil				5.4	0.0	1.0	0.9
Phenol	ug/l	5.0*		2.0*		29	0	4	2
Turbidity	units	No contrast with natural appearance				180.0	0.6	15.4	8.0
Color	"	15		5		15	0	5	4
Threshold Odor	"	20*		8*		800	4	56	30

*tentative

Data based on 48 samples

Station 17 - Dunne Crib Water Intake

The Dunne Crib water intake supplies water to the city of Chicago's South District Water Filtration Plant and is the second control point designated by the Calumet Area Technical Committee for open Lake Michigan water. The Calumet Harbor breakwater protects this intake from pollution originating in the Calumet Area so that the water quality at this point is better than at any of the other water intakes previously mentioned.

The bacterial quality of the water is good. The criterion for total coliforms and the criterion for fecal streptococci was violated only twice during the first six months of 1967.

The dissolved oxygen concentration was high and the oxygen demand was low. Table 17 on page 80 shows that several of the chemical criteria, especially the nutrients, were violated.

The criteria for chlorides, ammonia, total phosphates, iron, dissolved solids and phenol were also violated. This may have resulted from long periods of turbulent weather which is known to cause higher concentrations of many of the chemical constituents in the lake.

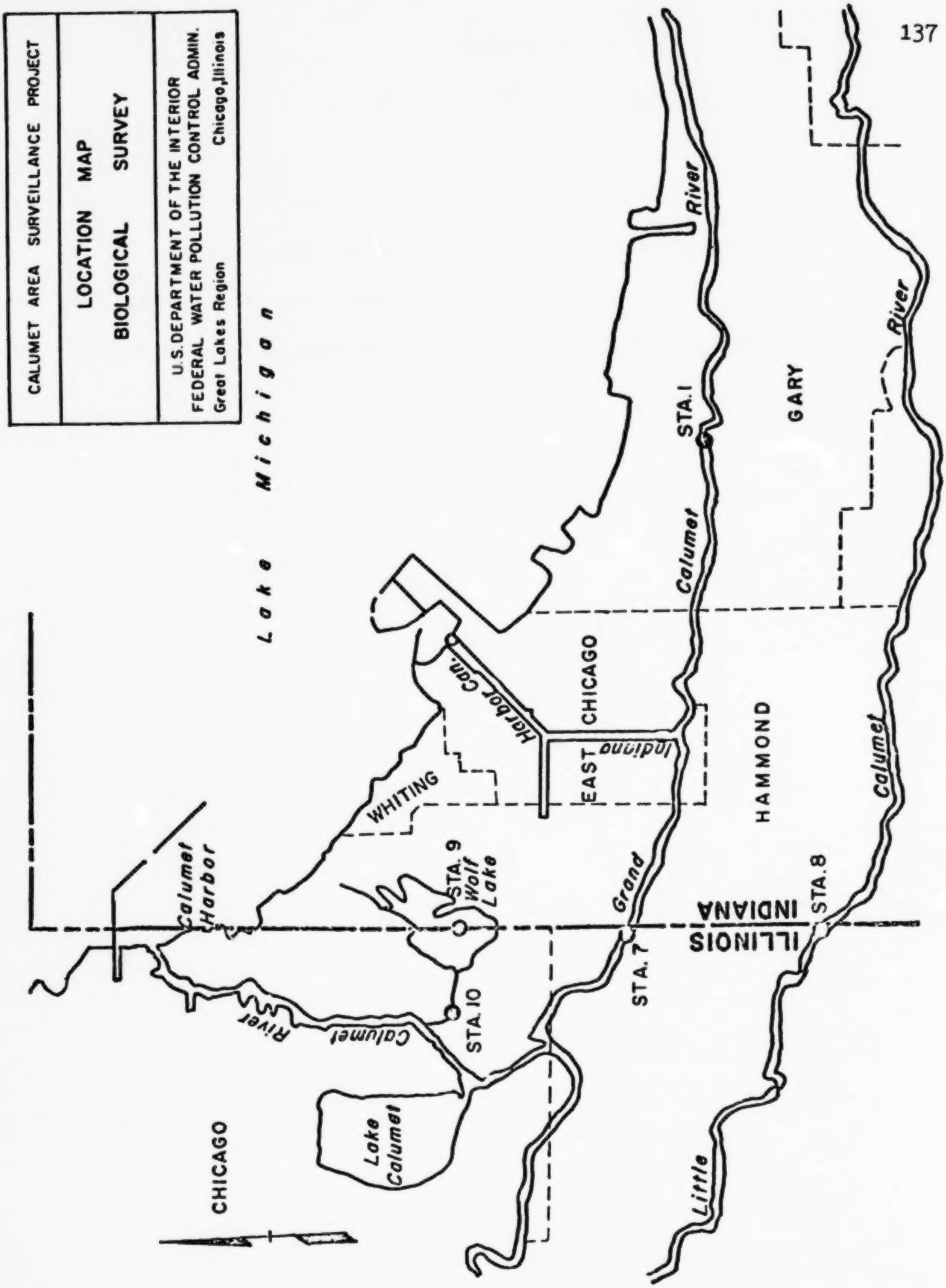
TABLE 17

CHEMICAL QUALITY OF WATER
STATION 17 - SOUTH DISTRICT DUNNE CRIB WATER FILTRATION INTAKE-LM 536.4

Parameter	Recommended Criteria				Aug. 1966-June 1967			
	Max	Min	Mean	Median	Max	Min	Mean	Median
Water Temp. °C	29.4				23	3	12	12
pH	9.0	7.7		8.1-8.4	8.5	7.2	-	7.9
Conductivity umho/cm	-	-	-	-	350	250	288	290
Alkalinity mg/l	-	-	-	-	120	88	106	108
DO "	-	80% sat.	90% sat.	-	16.30	6.5	12.33	13.20
BOD "	-	-	-	-	3.0	0.2	1.2	1.1
COD "	-	-	-	-	18	2	10	8
Sulphates "	50		23		32	13	23	23
Chlorides "	15		8		17	8	10	9
MBAS "	0.20		0.05		0.12	0.01	0.05	0.04
NH_3-N) "	0.05*		0.02*		0.33	0.01	0.08	0.05
NO_2+NO_3-N)tot.N"	0.04*				0.92	0.05	0.25	0.22
Org. N "					0.70	0.02	0.24	0.23
Sol PO_4 "	-	-	-	-	0.25	0.01	0.04	0.04
Total PO_4 "	0.04*		0.03*		0.21	0.02	0.07	0.05
Iron "	0.30		0.15		3.90	0.01	0.41	0.23
Cyanide "	0.025				0.01	0.00	0.00	0.00
Sus. Solids "	-	-	-	-	135	1	17	7
Dis. Solids "	200		162		205	37	165	168
Fluorides "	1.3		1.0		.50	.16	.30	.26
Oil & Grease "	Free from floating oil				6.7	0.0	0.9	0.9
Phenol ug/l	3.0*		1.0*		9	0	1	1
Turbidity units	No contrast with natural appearance				160.0	0.6	29.3	4.5
Color "	15		5		10	0	3	3
Threshold Odor "	8		4		50.0	1.5	7.8	5.0

*tentative

Data based on 48 samples


CALUMET AREA SURVEILLANCE PROJECT
LOCATION MAP
BIOLOGICAL SURVEY
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region
Chicago, Illinois
Lake Michigan
Calumet Harbor
CHICAGO
Lake Calumet
Calumet River
STA. 10
STA. 9
Wolf Lake
WHITING
Harbor Can.
EAST CHICAGO
Indiana
HAMMOND
GARY
Grand Calumet River
STA. 7
STA. 1
Little Calumet River
STA. 8
ILLINOIS
INDIANA

R. J. Bowden

BIOLOGICAL SAMPLING PROGRAM

For the purpose of the biological sampling program five stations were selected from the seventeen regular sampling stations utilized by the Calumet Area Surveillance Project. The five selected represent a wide variety of water quality conditions.

Station 1 (Grand Calumet River-east) represents a stream highly polluted by industrial wastes.

Station 7 (Grand Calumet River-west) represents a stream highly polluted by industrial and municipal wastes.

Station 8 (Little Calumet River) represents a stream heavily polluted by combined sewer overflow.

Station 9 (Wolf Lake) represents a relatively pollution-free lake.

Station 10 (Wolf Lake Outlet) represents a relatively pollution-free stream.

On April 13, 1967, Dendy-type samplers containing sand, shell and sawdust substrates were set on the bottom at each of the five stations. This permitted the gathering of information on biological conditions at various locations in the Calumet Surveillance Area during the spring of 1967. The effectiveness of sampling benthic organisms by the Dendy sampler was compared with that of two conventional bottom sampling devices, the Eckman dredge and the Petersen dredge. A previous study during October 1966 indicated that the Dendy sampler did not quantitatively sample the benthic organisms as well as the other two samplers. The samplers were set for a period of 14 days after which time they were retrieved and examined for various organisms that had been attracted to the various substrates. At the time (April 27, 1967) each of the Dendy samplers was retrieved, a bottom sample was collected in the vicinity with either an Eckman dredge or a Petersen dredge. A surface water sample also was collected at each of the sites for phytoplankton analysis. The Dendy sampler at Wolf Lake (Station 9) was destroyed by fishermen or vandals.

All samples were analyzed by personnel of the Biology Laboratory, Chicago Program Office, during the period May-June 1967. Results are shown in Tables 18 and 19 on pages 84 and 85.

Benthos

Table 18 indicates that pollution tolerant organisms, especially the Tubificidae (sludgeworms) were taken at all stations except the Wolf Lake Outlet (Station 10) by both sampling devices. At Station 10, both the Dendy sampler and the Petersen dredge took species less pollution-tolerant than sludgeworms.

The numbers of sludgeworms taken at the Indiana Harbor Belt Railroad Bridge (Station 7) by Dendy and Eckman samplers were quite similar. An oil film was noted on the surface of the water at this station. The number of sludgeworms taken by Eckman Dredge at the Pennsylvania Railroad (Station 1) and at the Wentworth Avenue Bridge (Station 8) far exceeded the number of these organisms collected by the Dendy sampler at the same sites.

Table 18 indicates that materials used as substrates on the Dendy sampler vary considerably in their effectiveness in luring benthic organisms. In the present study, sawdust was most effective for collecting sludgeworms, followed by shells and then by sand. The kinds of organisms collected on the three substrates were quite similar.

In conclusion, it was noted that pollution-tolerant organisms, especially sludgeworms, were taken by both samplers at all stations except the Wolf Lake outlet. These worms indicate pollution in the streams at these sites.

In comparing the effectiveness of the Dendy samplers with the other two samplers, it was noted that the numbers of the organisms taken by either the Eckman dredge or the Petersen dredge far exceeded those taken by the Dendy sampler at the same sites. This difference in numbers of organisms collected by the samplers was noted in the previous study. Therefore, it has been concluded that, although the Dendy sampler may qualitatively sample a stream fairly well, it is not as effective in quantitatively sampling a body of water for benthic organisms as is either the Eckman dredge or the Petersen dredge.

Phytoplankton

Table 19 shows the presence of all algal groups except green filamentous algae in Wolf Lake. Fewer groups were represented in the samples collected from the Little Calumet River (Station 8) and Grand Calumet River (Station 1). However, considerable numbers of green flagellates, mainly Euglena, were recorded in Little Calumet River at the Wentworth Avenue Bridge. This indicates that some organic enrichment such as sewage is entering the stream above this station. Fewer numbers of algae were found in the Grand Calumet River. A heavy film of oil was noted on the surface of the stream at the Indiana Harbor Belt Railroad Bridge (Station 7). The water in the stream at the Pennsylvania Railroad Bridge (Station 1) was turbid with some reddish colored material and an oil film was noted on the surface.

TABLE 18

COMPARISON OF KINDS AND NUMBERS OF BENTHIC ORGANISMS COLLECTED IN A DENDY SAMPLER WITH OTHER BOTTOM SAMPLERS

STATION	TYPE OF SAMPLERS COMPARED	DEPTH OF SAMPLE (M)	SUBSTRATE	SPECIES AND NUMBER OF ORGANISMS TAKEN BY DENDY SAMPLER		SPECIES AND NUMBER OF ORGANISMS TAKEN BY BOTTOM DREDGES	
1. Grand Calumet River at Pennsylvania R.R.Bridge	Dendy and Eckman	0.6	Sand	Sludgeworm	31	Sludgeworm	437
			Shell	Sludgeworm	23		
			Sawdust	Sludgeworm	45		
7. Grand Calumet River at Indiana Harbor Belt R.R. Bridge	Dendy and Eckman	0.2	Sand	Sludgeworm	8	Sludgeworm	51
			Shell	Sludgeworm	34	Flowerfly larva	2
			Sawdust	Sludgeworm	42	Tricoptera larva	1
8. Little Calumet River at Wentworth Ave.	Dendy and Eckman	1	Sand	Bloodworm	1	Sludgeworm	274
				Sludgeworm	1		
				Sludgeworm	3		
			Shell	Bloodworm	1		
				Sludgeworm	1		
				Sludgeworm	13		
			Sawdust	Diptera Bloodworm	2		
				Sludgeworm	18		
				Biting midge	1		
				Crane Fly	1		
10. Wolf Lake Channel at Corondolet Ave.	Dendy and Petersen	0.3	Sand	Nymph	1	Sludgeworm	6
			Shell	"	1	Sludgeworm	4
				Snail	1	Midge	1
				Damsel Fly Nymph	1	Leach	1
				Biting midge	1		
				Snail	1		

TABLE 19
PHYTOPLANKTON, CALUMET SURVEILLANCE AREA

	Number of Organisms per Milliliter								
Station	Centric Diatoms	Pennate Diatoms	Green Coccoids	Green Fila-mentous	Blue-Green Coccoids	Blue-Green Fila-mentous	Green Flag-ellates	Brown Flag-ellates	Total
1. Grand Calumet River at Pennsylvania R.R. Bridge	572	616					132		1,320
7. Grand Calumet River at Indiana Harbor Belt R.R. Bridge	44	44	110			44	88		330
8. Little Calumet River at Wentworth Ave. Bridge	374	198				220	3718		4,180
9. Wolf Lake at Ill.-Ind. State Line	132	1694	1716		198	1430	44	66	5,280
10. Wolf Lake Channel at Corondolet Ave.	88	726	3256			44	66		4,180

R. J. Bowden

United States Steel Landfill Surveillance

During March 1967 the United States Steel Company at Gary, Indiana, began work on a 330-acre landfill in Lake Michigan. Shortly thereafter the mayor of Gary expressed concern about the possibility of excessive turbidity or other adverse effects on the municipal beach at Gary being caused by the landfill operation. A weekly surveillance of the beach and landfill area has been established with the concurrence of the State of Indiana.

Samples from a series of ten points were analyzed for turbidity and pH. As of July 20, 1967, no adverse effects on the Gary beaches, attributable to the landfill operation, have been observed. The following table presents the results of this program. Turbidity is in Standard Jackson turbidity units.

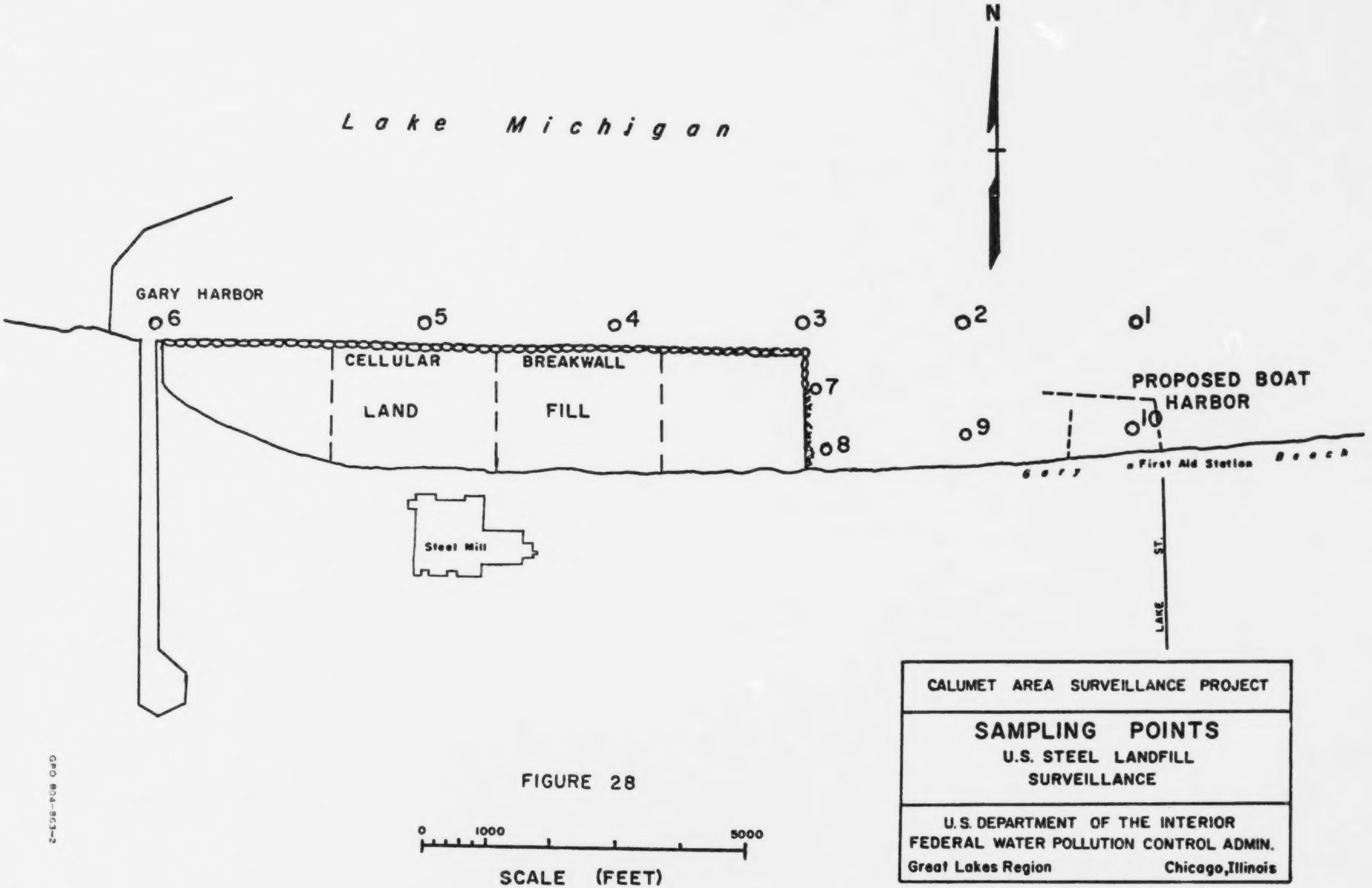
R. J. Bowden

U. S. STEEL LANDFILL

20 April - 20 July, 1967

Station	Turbidity			pH		
	Max	Min	Mean	Max	Min	Median
1	33.0	1.2	6.8	8.1	7.7	8.0
2	11.0	0.7	3.0	8.3	7.3	8.0
3	11.0	0.7	3.3	8.3	7.5	7.9
4	9.0	1.2	3.0	8.2	7.5	7.8
5	9.0	1.3	2.8	8.2	7.5	7.8
6	22.0	1.3	7.3	8.5	7.5	7.9
7	27.5	1.2	5.6	8.3	7.7	8.1
8	37.0	1.2	8.0	8.2	7.1	7.8
9	32.5	1.2	8.5	8.0	7.3	7.9
10	45.0	1.0	9.5	8.1	7.6	7.9

Data based on 10 samples



CALUMET AREA SURVEILLANCE PROJECT

SAMPLING POINTS
U.S. STEEL LANDFILL
SURVEILLANCE

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMIN.
Great Lakes Region Chicago, Illinois

FIGURE 28

MR. STEIN: Will you continue, Mr. Bowden?

MR. BOWDEN: The report is based on data from a weekly sampling program at 17 points throughout the area. This data has been supplied on a regular basis to the two States and the Metropolitan Sanitary District. The report on the beaches is based on a twice-weekly sampling program that has been carried out on seven beaches since May 18, 1967. The beaches sampled are Rainbow Beach and the two Calumet Park beaches in Chicago, Hammond Beach, Whiting Beach, East Chicago Beach and the Hammond, Indiana, Beach on Wolf Lake. The State of Indiana and the Chicago Park District also carry out complementary sampling programs and the data from these programs is freely interchanged.

In general, the bacterial quality of the three Chicago beaches remained the same as in 1966. That is, they met the standards about 60 percent of the time. The alewife kill greatly reduced the attractiveness of the beaches, but the bacterial counts did not increase until after the peak of the alewife invasion in June.

During the first three weeks in July the counts did increase considerably. It is possible that this was because the decaying alewives provided an environment in which the coliform multiplied rapidly. During the latter part of the month the counts returned to safe levels.

The Lake Michigan beaches in Indiana are still subject to heavy pollution and were unsafe for bathing about 80 percent of the time during 1967. This is due, in part, to their proximity to Indiana Harbor, but primarily to the presence of combined sewer overflows which discharge untreated sewage to the lake during and immediately after periods of rainfall.

The beach on Wolf Lake met the criteria on all occasions.

The most serious pollution discharge to Lake Michigan is from Indiana Harbor and its canal. The first group of slides show pollution discharging from the harbor to the lake.

The first slide shows pollution from the harbor to the lake. It does not show up as well as it should here, but on the right of the slide you can see a plume of yellow water which is discharging from the harbor, which is on the right, to the lake, which is on the left. The boat you see in the middle of the slide is taking samples for the Federal Water Pollution Control Administration.

Next slide, please.

This (indicating) is another picture showing the same plume. You can see the yellow color compared with the darker blue color of the lake.

R. J. Bowden

Next slide, please.

This (indicating) is a close-up showing the borderline between the yellow plume coming from Indiana Harbor and Lake Michigan waters.

All of these pictures were taken during July and August of 1967.

As you can see on the map, the Indiana Harbor Canal is an extension of the eastern portion of the Grand Calumet River, which rises in Gary, Indiana. This stream is the most heavily polluted stream in the area and has, since March 1965, become more heavily polluted. Floating oil and grease has been consistently observed all along the stream, as can be seen in the following slides.

This (indicating) is a slide taken at Columbia Boulevard, and it shows oil being discharged to the Indiana Harbor Canal. The canal is flowing from the lower left to the upper right and discharging into Lake Michigan.

MR. POSTON: When was that slide taken?

MR. BOWDEN: This slide was taken early in 1966.

MR. POSTON: In 1966?

MR. BOWDEN: I'm sorry. Early in 1967.

Next slide, please.

This slide (indicating) shows the confluence of the St. George Branch on the right and the main Indiana Harbor Canal on the left. The canal flows toward the lower left of the slide towards Indiana Harbor, and you can see the oil in the harbor coming from the main portion of the canal, along which there are several industries, including Sinclair Oil, and, of course, as you can see, the steel company.

Next slide, please.

This slide (indicating) was taken in Indiana Harbor Canal, the main branch of Indiana Harbor Canal near the lake. On the upper part of the slide is Youngstown Sheet and Tube Company, and on the lower part of the slide is the Inland Steel Company. As you can see, there is considerable oil which is flowing towards Lake Michigan.

Next slide, please.

This slide (indicating) is taken further out in the harbor itself. The boat you see there is in the main shipping channel, and the water is flowing from the left to the right towards Lake Michigan. As you can see, there is considerable oil all over the harbor.

Next slide, please.

This slide (indicating) is further out. We are looking out from the harbor out towards the lake. That black spot on the slide there is a navigation buoy, and you can see the oil flowing from the harbor to Lake Michigan.

The bacterial counts in Indiana Harbor and its canal are still far above the levels permitted by the standards and concentrations of industrial wastes have increased significantly. The concentrations of iron, cyanide and phenols, all typical of steel mill wastes, were higher during the first six months of 1967 than they were during 1966.

The next two slides, taken upstream in Gary, Indiana, show the color of the Grand Calumet River.

As you can see, the grass on the bank is green, and you compare that with the muddy brownish-red color of the water.

The suds in the slide, by the way, come from the Gary Sewage Treatment Plant, and the column there reflected is on the Indiana toll road.

Next slide, please.

This (indicating) is another slide showing the Gary Treatment Plant in the background and the muddy brownish-red color of the water.

Further downstream, on the Indiana Harbor Canal at Dickey Road, the dissolved oxygen fell below 1.0 mg/l one month earlier in 1967 than in 1966. Zero dissolved oxygen was often found during June, indicating the severity of the problem. As the water enters Indiana Harbor it mixes with water from the lake so that dissolved oxygen ceases to be a serious problem, but the pollutants that caused the problem are still there and eventually find their way to the water intakes of Hammond, East Chicago, Whiting, Gary and Dunne Crib, and also to the beaches of Hammond, East Chicago and Whiting.

The other branch of the Grand Calumet River, which flows across the State line to Illinois, had shown some signs of improvement during 1966 but had suffered a relapse during December. During January of 1967 the stream returned to its pre-December condition, but is still far more polluted than the standards permit. At the March 15, 1967, meeting the reason for this relapse had not been determined, but a subsequent study of the data has revealed that it was due to the presence of a large quantity of raw or inadequately treated sewage in the stream. The heavily polluted condition of the stream is apparent in these slides taken near the State line during May 1967.

This slide (indicating) is taken from the Indiana Harbor Belt Railroad Bridge and is looking on to the Illinois side of the bridge. The water is flowing from the left to the right, and, as you can see, there is a considerable amount of oil, and there is a sludge bank right in the middle.

MR. BACON: Mr. Bowden, where is that on this map?

MR. BOWDEN: Right here (indicating).

MR. BACON: At the Belt Railroad Bridge?

MR. BOWDEN: Right there.

This slide (indicating) is also taken at the Belt Railroad Bridge. It is looking from the Illinois side of the bridge towards Indiana, and the water is flowing from the right to the left underneath the bridge.

As you can see, there is a considerable amount of debris and the water is black, and there is a tremendous amount of sludge in the area. In general, the situation is not good.

MR. BACON: Mr. Bowden, may I ask a question about this?

MR. BOWDEN: Certainly.

MR. BACON: Mr. Chairman, all right?

MR. STEIN: Go right ahead.

MR. BACON: Where is this coming from? Is this basically the Hammond plant, or is it pulling from the entire river system?

MR. BOWDEN: No, this is basically from the Hammond plant and from one or two small industries that are on this portion of the river.

This roughly is a continental divide (indicating) and this is located at the Hammond Sewage Treatment Plant outfall. The waters on this side of the dotted line (indicating) flow to Lake Michigan and eventually into the St. Lawrence River, and the waters on this side of the dotted line (indicating) flow down the Illinois River, down the Mississippi River, to the Gulf of Mexico.

MR. BACON: Thank you.

MR. BOWDEN: During June 1967 the bacterial counts rose, but this time the increase occurred in all of the stream stations in the area and, therefore, can be attributed to combined sewer overflows and runoff from the rains that occurred during May and June. The effect of years of continuous heavy pollution in this stream is apparent in the next slide which was recently taken at the confluence of the Grand Calumet River western branch with the Little Calumet River.

As you can see (indicating), the color of the water is very black, and there is very black sludge being boiled up by the boat.

By the way, the boat almost ran aground on this ride when the pictures were being taken. The picture was taken right about here (indicating) at the confluence of the river with the Little Calumet River.

The Little Calumet River at Wentworth Avenue is still very severely affected by combined sewer overflows. The stream often has heavy algae blooms and is heavily infested with sludgeworms and is often very turbulent. The following two slides, taken in May of 1967 near the State line, show the extent of the algal bloom, and the turbidity in the stream.

This (indicating) is the Wentworth Avenue Bridge, which is in Illinois very close to the State line. The water is flowing from under the bridge towards the right of the slide in Illinois. As you can see the color, there is a greenish cast to the water and it is very turbulent.

Next picture, please.

This (indicating) is another picture showing the same condition, this time looking under the bridge towards the Indiana portion of the stream. The water is coming from the background towards the foreground.

Wolf Lake and its outlet continue to be high quality bodies of water suitable for all uses, but higher than normal concentrations of phosphates and ammonia threaten to cause algae blooms and other problems in the future. Foam is periodically reported on the lake and on the shore. The cause of this foam is not certain. Standard tests reveal no significant concentration of detergents in the lakes. The Federal Water Pollution Control Administration Chicago laboratory has received new equipment that will be used for the purpose of making more sophisticated analyses to determine the cause of this foam.

Conditions in Calumet Harbor and at the mouth of the Calumet River have not changed significantly since 1965. The predominant flow is from the lake to the river because of the control at the O'Brien Lock. This results in higher quality lake water diluting the river water and, therefore, the quality is good except for oil and iron which is discharged to the harbor and often discolors the water.

The following slides show waste being discharged to the harbor.

The breakwater you see there (indicating) is the Calumet Harbor breakwater, and the industry at the bottom is the United States Steel South Works.

MR. POSTON: Where is that located on the map?

MR. BOWDEN: It is located right here (indicating). Here is the harbor and here is the river mouth, which you see on the left of the slide.

Next slide, please.

This slide (indicating) shows red discharge to the harbor, probably consisting of mostly iron. This is coming from the United States Steel South Works into Calumet Harbor.

MR. POSTON: This goes into Calumet Harbor?

MR. BOWDEN: That is correct.

MR. POSTON: Part of Lake Michigan then?

MR. BOWDEN: That is correct.

This (indicating) is another slide showing the same discharge from another angle.

Next slide, please.

This slide (indicating) shows oil being discharged from the North Slip of United States Steel into Calumet Harbor. The Calumet River is being pointed out now, showing Inland. The breakwater down here is part of the Calumet Harbor breakwater.

Next slide, please.

This (indicating) is another shot showing the oil being discharged into the harbor from the North Slip of United States Steel.

Next slide, please.

This (indicating) is another shot showing a close-up of the same problem.

MR. POSTON: Where is that picture taken?

MR. BOWDEN: That picture is taken at the North Slip, United States Steel.

Next slide, please.

This slide (indicating) illustrates part of the problem that Mr. Poston mentioned earlier. This is a dredge taking material from Calumet Harbor out into the lake. As you can see, it is leaving a considerable trail of material which is coming from the barge as it goes out to the dumping end.

MR. BACON: How far offshore was that barge?

MR. BOWDEN: To tell you the truth, Mr. Bacon, I don't know.

MR. POSTON: Probably two or three miles.

MR. BACON: How far is the dumping area?

MR. POSTON: About 14 miles.

This gives you an idea of some of the problems that we have to work out in the study that has been goingon between the Corps of Engineers and the Department of the Interior to find better disposal methods than the dumping of dredge material in the lake.

MR. BACON: Was this simply a leakage from the barge?

MR. POSTON: We noticed this many times in many areas where they are dredging. These are hopper-bottom dredges, where they open the bottom when they get out there.

I think it may not even be necessary to do more than turn around if this is the practice, to get to the dredging area and turn around and come right back.

MR. BACON: Do these hopper-bottoms have locks on them, on the mechanism?

MR. POSTON: Supposedly they are tight -- supposedly.

MR. BACON: Are they accompanied by an inspector?

MR. POSTON: I think they do not have inspectors on these barges at the present time.

MR. BACON: There are two things that would very easily solve this problem if there does happen to be inadvertent leakage along the way, and that would be a lock and an inspector.

MR. POSTON: Yes.

MR. BOWDEN: Thank you.

The water intake at East Chicago was affected by wastes from Indiana Harbor. The standards for iron, phenols and ammonia were not met. The industrial nature of this pollution is made evident by the fact that the criteria for parameters indicating domestic pollution (BOD, coliforms, MBAS and dissolved solids) were met; however, the Hammond Water Intake was affected by the direct combined sewer discharges to Lake Michigan as well as by wastes from Indiana Harbor.

At the Gary water intake and the Dunne Crib intake, which serves the City of Chicago, the standards for chlorides, ammonia, total nitrogen, total phosphate, iron, dissolved solids, phenols and threshold odors were not met.

I would like to summarize the report by reading its conclusions and recommendations, which can be found on Pages 9 and 9-A.

R. J. Bowden

CONCLUSIONS

1. Industrial pollution in the Grand Calumet River-Indiana Harbor Canal System has become more severe since 1965. The findings indicate that concentrations of iron, cyanide and phenolic compounds were all higher than in 1965.

MR. BACON: Do you have a percentage figure on that? Is it 10 percent, or 20, or 50?

MR. BOWDEN: I haven't got an actual percentage figure.

MR. BACON: Can you generalize?

MR. BOWDEN: I can generalize. For phenols, in the winter of 1966-67, they were about 50 percent higher than during the previous winter. Iron has increased almost 100 to 150 percent.

MR. POOLE: That general conclusion is predicated on those three parameters, or on all parameters, when you say it was worse?

MR. BOWDEN: The conclusion is based on those three parameters, which, of course, are indicative of industrial wastes.

MR. POOLE: I think there was quite a phenol spill in January or early in 1967.

MR. BOWDEN: Yes, there was, and this was an incident where, right here, we found a concentration of

16,007 parts per billion of phenol, which is considerable when the criteria call for a maximum of five.

MR. POOLE: Granted.

MR. BOWDEN: This figure was not included in the average that I am referring to, because it was an individual spill from United States Steel in Gary, and they, I understand, have taken measures to see that this is not repeated.

MR. STEIN: Did you have another question, Mr. Bacon?

MR. BACON: Yes. I wanted him to continue with the generalization on the cyanides.

MR. STEIN: Yes. Would you characterize that?

MR. BACON: Generalize as to the increase on cyanides.

MR. BOWDEN: The cyanides were approximately 50 percent higher all along the river.

MR. BACON: Thank you.

MR. BOWDEN: 2. Bacterial quality in the Grand Calumet River-Indiana Harbor Canal System is still unsatisfactory.

3. Floating oil was consistently reported at all stations on the Grand Calumet River-Indiana Harbor Canal System.

4. The water quality in the western portion of

the Grand Calumet River at the State line improved slightly during the summer of 1966, but deteriorated during the winter due to an increased amount of raw or inadequately treated sewage reaching the stream. The stream did not meet the standards at any time.

5. Overflow from combined sewers associated with heavy rainfalls during April and May of 1967 caused a significant increase in bacterial counts at all stations.

6. The water quality in the Little Calumet River has improved since 1965, but the stream is still subject to severe pollution from combined sewer overflows and does not meet the standards.

7. Wolf Lake is a high quality body of water, suitable for all water uses but is threatened by high nutrient concentrations. Except for nutrients, there was substantial compliance with the standards.

8. The water quality at the East Chicago and Hammond water intakes meets some of the standards but is affected by wastes from Indiana Harbor and direct discharges to the lake, causing violation of the standards for ammonia, total phosphates, iron, phenol and threshold odors.

9. The water quality at Chicago's Dunne Crib and the Gary water intake did not meet the standards for chlorides,

ammonia, total phosphate, iron, phenol and threshold odor.

10. The water quality at Chicago beaches was satisfactory except during early July and during periods of easterly winds when such winds locked in the contamination that might otherwise have been carried away.

11. Oil and grease was consistently found in samples from all of the water intakes.

12. The large number of alewives that died and were washed onto the beaches caused a severe odor and esthetic problem but did not cause immediate increase in the bacterial counts. Decaying fish may have caused the increased counts during July.

13. The water quality at Indiana beaches was not satisfactory, due to wastes from Indiana Harbor and direct discharges to Lake Michigan.

Recommendations to the Conference

1. That numerical criteria for total iron, cyanide, sulphate and oil be included in the standards adopted for the Grand Calumet River.

2. That the criteria for ammonia in open Lake Michigan waters be reviewed in light of the high levels routinely found in the lake and the recommendations in the

Laboratory Committee's report on ammonia.

3. That the criteria for MBAS be reviewed in light of the limitations of the laboratory analytical procedure reported in Standard Methods.

Thank you.

MR. POSTON: What is MBAS?

MR. BOWDEN: MBAS is methylene blue active substance, and it is used as an indicator of the factors for detergent material in the water.

MR. STEIN: Are there any further comments or questions?

Mr. Klassen?

MR. KLASSEN: There was one statement, Mr. Bowden, on Page 3 of your report, which confuses me just a little as a conferee. The statement is:

> "The conclusions drawn in this report regarding water quality conditions in the Calumet area are made relative to certain specific water quality standards."

This is the statement that confuses me. These standards, which are referred to throughout the report, are those proposed by the State of Indiana and approved by the Secretary of the Interior on July 18, 1967?

As a conferee, I am under the distinct impression that the conferees adopted standards, and up to this point all of the evaluation was on the basis of the conferees' standards.

When did the conferees lose their standards? I don't recall ever adopting the standards to which you refer, and which apparently is a unilateral action on the part of the Federal Water Pollution Agency.

I would like to have you explain that.

MR. BOWDEN: The conferees have never lost their standards. The standards adopted by the State of Indiana for this area are identical to the standards proposed by the conferees.

MR. KLASSEN: Then why didn't you use the conferees' standards?

MR. BOWDEN: They are also identical to the standards proposed by the State of Illinois for the area.

The reason I did not label them as the conferees' standards as such is that -- well, you might call it political. It is actually the standards that have now been adopted and actually are law, whereas with reference to the conferees' standards, I don't know if they were actually that strong, but the standards as they are now adopted are part of the law of the land, and that is the only reason that I labeled them as such.

They are exactly the same standards adopted by the conferees at that last meeting.

MR. KLASSEN: The next part of it really concerns me, because if these have been adopted then as the law of the land, they supersede the conferees' standards.

You are talking about criteria. Now, you are talking about standards and part of the standards that the Federal Water Pollution Control Agency has adopted then include in these standards, which are now standards, the implementation schedule which gives the industries until June 30, 1970, to complete their facilities.

This is not what the conferees had adopted. We have never changed this. Yet it looks like, by unilateral action, the Federal Water Pollution Control Agency, by adopting these, adopted a new time schedule.

MR. BOWDEN: I don't believe this is the case. However, I would like to call on Mr. Poston or Mr. Stein to clarify the point.

MR. STEIN: Well, I will make a deal with you. If you stay out of the law, I will stay out of the engineering business.

Mr. Poston?

MR. POSTON: Well, I think what is applicable here is the standards that the conferees adopted, and I think if it is necessary to change this report, that we should talk about the standards that the conferees have adopted.

MR. KLASSEN: If you adopted standards, which you say you have, then you are adopting a whole new time schedule with those standards, and this is something that negates everything that the conferees have agreed to, and it makes me wonder just where in this picture the conferees stand now. It looks like we have been superseded unilaterially by the Federal Water Pollution Control Agency.

Is this true?

MR. POSTON: I think not.

MR. KLASSEN: That is what it says here.

MR. STEIN: Are there any other comments or questions?

MR. BACON: Mr. Chairman, I have one.

MR. STEIN: Yes?

MR. BACON: You mentioned that the Little Calumet, at the State line, due to the combined sewer overflows, shows turbidity and algal growths.

What about dry weather conditions? What is the condition of the Little Calumet as far as meeting water quality standards is concerned? What is the situation?

In other words, we can understand that during a combined sewer overflow, but what about dry weather conditions?

MR. BOWDEN: Dry weather conditions are somewhat better, but, of course, when there is heavy overflow there is settling out, and sometimes the water is clear and meets most of the criteria, and in other cases it does not.

MR. BACON: You see what I am getting at. I would like to have you generalize if you can't be more specific as to whether standards are being met during dry weather conditions at the State line.

MR. BOWDEN: During dry weather conditions, the standards are being partly met.

MR. BACON: Partly met? Thank you.

MR. POOLE: I think, Mr. Bacon, there is still some raw sewage and Hammond is in the process of building an interceptor now, so there is minor dry weather flow in there in addition to storm overflow.

MR. BACON: Thank you.

MR. POSTON: Mr. Bowden, I noticed that your reports deal primarily with pollution in the Indiana portion. Why didn't you get into the Calumet River?

You did point out one place in Illinois there in Calumet Harbor and showed pictures where oil pollution and heavy solids were coming into the lake. Why didn't you get down into some of the other areas of the Calumet River?

MR. BOWDEN: The reason I didn't deal with the other areas of the Calumet River is because our surveillance project is mainly located east of the Calumet River.

The Metropolitan Sanitary District has been maintaining surveillance of the Calumet River -- in fact, the Cal-Sag Channel and other streams in the Chicago area.

MR. POSTON: In other words, the conferees' directions to you have been to do this other area?

MR. BOWDEN: That's right.

MR. STEIN: Yes, Mr. Bacon?

MR. BACON: Isn't it true also that the original conferees' findings and recommended criteria did not apply to the Calumet River, the position being taken that that was under the jurisdiction of the Sanitary District and would be covered by State and Sanitary District criteria which have been adopted?

MR. KLASSEN: This is correct. It was not considered as an interstate stream.

MR. BACON: At the time of the original conference and in any conference since then, this has never been included beyond the lake point, the mouth of the river, in the criteria.

MR. KLASSEN: Correct.

MR. POSTON: This is a part of the conference area, and it was felt that the Sanitary District would do monitoring in this stream and maintain treatment facilities.

MR. BACON: I am really rising to the defense of Mr. Bowden here. How could he make the report since until so very, very recently criteria were not available on the Calumet River as of June 28th, I believe, or 30th, Mr. Klassen, at the time Mr. Egan took over the monitoring, but that is the first we had of specific criteria on the Calumet River.

MR. POSTON: I think Mr. Bowden's pictures are very clear now. It doesn't really need any criteria to show us that Lake Michigan is being polluted in the Calumet Harbor area with this oil and this heavy turbidity and the iron solutions that are coming out into the lake at that point.

MR. BACON: Excuse me. I want you to very clearly understand I am not talking about the lake. We traveled it just last Saturday again, right at the mouth of the river.

I am talking about the river itself, and I am surprised a comparison was not made or some analytical comparison was not made here.

As you see, as it stands now, Mr. Chairman and conferees, by our program of positive displacement at all times, either through the O'Brien or through the lock and dam, we are keeping the flow. It is either a stagnant lake or pool or we are keeping it moving away from the lake at all times, and really, what we are doing, whatever pollution is reaching the mouth of the lake at the mouth of the river is being drawn into our system, and we are taking it out through the canal system.

MR. STEIN: In those slides he did show us, that stuff was getting into the lake.

MR. BACON: Lots of it. We can't get it all out. We are not flushing that fast.

MR. STEIN: Right.

MR. BACON: We haven't that much water.

MR. STEIN: I have a clarification question on your recommendations to the conferees. I am not quite sure I understand what you are getting at when you mention numerical criteria for total iron, cyanide, sulphate and oil being included in the standards. Rather than going through several questions, let me give you my problem.

I think at least with oil and cyanide, this has come up many times before, and I guess the numerical criteria you would want to use is zero, but then we get into that problem of zero tolerance. The people who develop the requirements considered the oil problem very, very seriously with the oil companies and the steel companies and representatives of the Sanitary Districts, with the States and us. The notion is if you say zero on oil, what happens? You really run into a problem, which I will come to in a second. What they came up with was no visible oil.

Now, I don't know, once you get down to the zero tolerances, whether you can do better, or you may have that with cyanide.

Here is what happens when you are talking about numerical values when you are getting down to zero tolerances:

These people, as Mr. Bowden has indicated, have a series of standard tests. You come down to a zero tolerance, or very close to that, you get a standard test, and these tests are one part per billion, and if it is below one part per billion you don't find anything.

Sure enough, while you are doing that testing and all the industries and the cities are putting out the same wastes, some bright young boy, like Mr. Bowden or one of his colleagues, comes up with a new test, and instead of one part per billion we can discover one part per trillion. Suddenly we begin finding the material you could not find before. Nothing has changed except the accuracy of the testing technique, and you have a violation.

The question here is, I wonder, when you are dealing with stuff like cyanide and oil, Mr. Bowden, is it realistic? Do you have a numerical kind of testing that would be realistic under those circumstances, or are we facing the zero tolerance problem?

MR. BOWDEN: Whether or not a low value being permitted is desirable, the present circumstance is that there is no criteria whatsoever.

MR. STEIN: I thought you said "no visible oil."

MR. BOWDEN: No visible oil. For cyanides --

MR. STEIN: What gets me is when you begin talking about numerical criteria. I am all for numerical criteria when we can get them, and numerical criteria are reasonable. But when we get to that vexing problem that we have had many, many times, and Food and Drug has had many times, to that zero tolerance, how meaningful is the development of numerical criteria for cyanide and oil, for example, as a concept?

MR. BOWDEN: At present cyanide can be detected one-hundredth of a milligram per liter. A criterion set at such a level would be better than no criterion at all, and there is no criterion for cyanide at all on the Grand Calumet River. There is for some of the other points, but not on the Grand Calumet River, so that if there is no criterion set whatsoever, why, there is no way that you could be in violation.

The same thing applies to iron, which can be detected at very low values. I am not a chemist, but I know that we can detect it at less than 10 parts per billion reliably.

There is no criteria set for sulphates, and once again, I have to admit I am not a chemist and I don't know how low we can detect it, but we can certainly detect it at a range below anything that would be objectionable.

MR. STEIN: How about oil?

MR. BOWDEN: Oil and grease, the criteria states, "no visible oil and grease."

Unfortunately, when oil is emulsified in water, it is below the water line, it is below the surface, and you might not be able to see it. In fact, sometimes you can have a thin layer on the top and not be able to see it.

MR. STEIN: Again, I am not arguing for a specific figure. What would you suggest as a possible value for this sort of thing, if we are talking in terms of numerical criteria?

MR. BOWDEN: Well, I believe that emulsified oil and grease can be detected at levels of one-tenth of a milligram per liter.

MR. POOLE: Mr. Stein?

MR. STEIN: Yes.

MR. POOLE: I don't know whether I can clarify this or confuse it. There are criteria for the inner lake that were adopted by the conferees, and they are the same ones that were subsequently adopted by Indiana and submitted to the Secretary. Where those two are in Indiana Harbor there, right about there is the control point on the Indiana standards for Indiana Harbor.

Now, there are numbers for everything but oil that Mr. Bowden is talking about at these points. It seems to me personally that what is back in the Grand Calumet River is immaterial if we have the right numbers where those two dots are as you go into Indiana Harbor, so I think that is their indirect control.

MR. BOWDEN: Unfortunately, Mr. Poole, there are criteria established for this entire river and there are control points established in these criteria for the river in this area.

I believe there is one at Kennedy Avenue and if, for instance, an industry located in Gary were meeting these criteria, and in a large measure they are meeting them except for phenol, in spite of the fact that this is one of the most polluted rivers in the world, then they can say they are meeting the criteria here. And how is anybody going to prosecute them for violations out here when there are other large industries located here and here (indicating)?

MR. POOLE: I don't believe that will be the case.

MR. BOWDEN: I hope not.

MR. STEIN: Do we have any further comments or questions?

(No response.)

MR. STEIN: If not, thank you very much, Mr. Bowden.

At this point, we will recess for ten minutes.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

Mr. Poston?

MR. POSTON: I would like Mr. Grover Cook, who is head of our Regional Office Enforcement Activities, to give us a brief rundown about the cladophora.

STATEMENT OF GROVER COOK, CHIEF, REGIONAL
OFFICE, ENFORCEMENT ACTIVITIES, FEDERAL
WATER POLLUTION CONTROL ADMINISTRATION,
DEPARTMENT OF THE INTERIOR, CHICAGO, ILLINOIS

MR. COOK: Mr. Chairman, Conferees, Ladies and Gentlemen:

I have a brief discussion on the cladophora problem, but before that, and to get you attuned to it, I have a few slides I would like to run through hurriedly, so that we can show you some of the problem.

This (indicating) is a rock, a big boulder, actually, up by Saugatuck, Michigan. It is probably six feet across. I learned to swim in the water right near there actually, and I have known of this boulder for a good many years -- I am not going to tell you how many, but a good many years -- and I have watched the algae grow on this thing over the years. I was interested more critically in the last few years as a biologist.

The filaments that are about two or three feet long, in the old days, and in fact only ten years ago, were only a matter of inches long.

Next slide, please.

This (indicating) is another boulder in the same area, with the same story. Underneath you can see the green growth that kind of comes out like a skirt in the water.

This (indicating) is the Calumet Park Inner Beach, a little overexposed, but you can see the cladophora that is washed ashore and, with waves, will wash up on the beach and start rotting.

MR. POSTON: Where is the cladophora there? Will somebody point that out?

MR. COOK: This (indicating) is the green growth that is washed up. It is almost in the water here. That is about ankle-deep, I imagine.

Next slide, please.

This (indicating) is another part of the same beach.

G. Cook

Next slide, please.

This (indicating) is another shot of the same beach. Some of it has washed up on the beach there.

Next slide.

This (indicating) is the same thing. Here is a pretty heavy mat of it. That is probably well over ankle-deep there and is very unpleasant for swimmers.

As Mr. Poston said, the increase in algae over the past several years is of great concern to us. I would like to discuss what is happening by outlining briefly some of the technical aspects of the problem.

Cladophora is the genus name for a group of filamentous green algae. These are very simple plants that may consist of one or of thousands of cells. The cells are shaped like minute green pipes and are about ten times as long as they are wide. In reproduction they divide in the middle and both halves grow to full length so that there are two cells linked end to end. As long as growth conditions are favorable, they continue to divide and the filament gets longer and longer. The original cell has a holdfast on one end that acts like a suction cup and keeps the filament attached to any firm object in the water.

The requirements for growth are water movement, sunlight, nutrients and a water temperature range of about

50 to 85 degrees Fahrenheit.

Cladophora is extremely efficient in taking up nutrients from the water and is found in lakes where nutrients are very sparse. However, under conditions of low nutrient concentrations the filaments may grow to only a fraction of an inch. If nutrients are increased, the length of the filaments increase.

This was demonstrated in a very carefully controlled experiment by John Neil of the Ontario Water Resources Commission in 1963. In three areas of Lake Huron that were completely devoid of cladophora but where all environmental requirements except nutrients existed, Neil fed phosphorus and nitrogen separately and combined. Where he fed phosphorus and nitrogen combined, a luxuriant growth developed. Where he fed phosphorus alone, he also obtained a very heavy mat of cladophora. But where he fed nitrogen only no growth developed. He concluded from this that phosphorus was the most essential element required for algal growth.

Phosphorus, nitrogen and all other plant growth elements are present in sewage. The conventional sewage treatment plant removes only a small fraction of the nutrients. The rest finds its way to a watercourse. If the sewage originates in the Lake Michigan drainage basin, most of the nutrients will eventually reach the lake. Added to this are the fertilizing elements from farm lands and livestock, wild animals and industry. Obviously there is continual buildup of nutrients and an accompanying increase in aquatic plants, especially algae.

Growths of caldophora in the southern end of Lake Michigan have been observed by me and by other biologists for many years, but more critically in the past ten years when nuisance conditions began to occur on the beaches. Where small tufts occurred ten years ago, there are now mats with filaments several feet long. When these growths break loose in heavy seas, they wash ashore to litter the beaches in slimy windrows. They clog water intake screens and interfere with swimming. When they decay they produce a putrid odor and provide a breeding place for flies and other insects.

Lakes Erie and Ontario have experienced these kinds of algal problems since about 1930. They have worsened over the years until now the algae builds up in knee-deep windrows. The southern end of Lake Michigan is now in about the same condition that Lakes Erie and Ontario were in the thirties.

The ills of Lake Erie have been diagnosed. Essentially we have said that we must greatly reduce inputs of phosphorus, and other nutrients, if we are to restore the biological health of the lake. With Lake Michigan some thirty years behind, we should be heedful of what happened in Lake

Erie and start immediately here to take every necessary step to prevent nutrients from entering the lake.

I would also like to introduce the alewife problem --

MR. STEIN: Wait a minute, please. Let's just handle these separately.

MR. COOK: Yes, sir.

MR. STEIN: Are there any comments or questions on the cladophora problem?

MR. POOLE: I want to ask Mr. Cook one question.

Do you think this is a subject that we might well reconvene our Technical Committee for and put back into their hands, Grover?

MR. COOK: I think it might be a good idea.

We are bringing it up here because we are so greatly concerned about the problem. Of course, we will use any forum we can find to push for some kind of a remedy, and I think this might be a good start, the reactivation of such a committee.

MR. KLASSEN: May I just raise a point that Mr. Poole mentioned here?

While I think that as conferees certainly we should be concerned with it, I wonder whether this is primarily an interstate problem between Illinois and Indiana.

It would seem to me that this is pretty much directly in the lap of the Federal Water Pollution Control Agency, and while I am not adverse to the conferees getting involved in it, why hasn't the Federal Government itself taken the lead, or why don't they take the lead instead of using the conferees as a springboard?

If you need this kind of help, we will go along.

MR. COOK: We need all the help we can get. Yes.

MR. KLASSEN: If this is a problem, and it undoubtedly is all over the lake, then why confine the efforts to starting it here in the south end of Lake Michigan, because certainly my concern is that if the conferees get into this, it is going to look like this is a problem between Illinois and Indiana, and one of the two of us is causing it, and I don't believe this is necessarily the case.

MR. COOK: I think you are right, of course. Wisconsin is a much greater contributor than Illinois, for instance.

MR. STEIN: This may involve all of the States bordering Lake Michigan.

Mr. Klassen, I think your remarks were pertinent before when you talked about unilateral Federal action. I don't know how unilaterial it was when they accepted Indiana's proposal, but I think if we are going to have a genuine State-

Federal program, on the one hand, you can't have unilateral action, and, on the other hand, when someone makes a proposal for State participation with the Federal Government, you say isn't this a Federal problem?

If we are going to have a genuine State-Federal program--and I think we are both in this--when a problem like cladophora comes up, or any other generalized problem in water pollution control, whatever technique we can use to get the States and the Federal Government in on the ground floor is, it seems to me, the best approach.

It also seems to me that your point is very well taken that if we are dealing with a cladophora problem, this is certainly not just an Illinois-Indiana problem in Lake Michigan. Evidently, if it is a problem caused by some activity of man, all the States bordering on the lake are probably equally concerned, as well as the Federal Government, and I don't think there should be any implication that these two States are the responsible parties for this problem.

MR. POSTON: The cladophora problem I regard as an indicator. The cladophora problem, in the first place, is a much more serious problem in others of the Great Lakes, but it is an indicator that there is a great deal of urgency in this pollution abatement matter, if we are not going to have more and more serious problems from these particular algal blooms, from the nutrients.

I think the same thing applies to the alewife, which we will be discussing a little later, that the alewife situation is an indicator that you upset the balance in this lake and you can look for some real problems that are not only expensive, but that you just are not going to tolerate.

MR. KLASSEN: My point, Mr. Chairman, is this --

MR. STEIN: Yes.

MR. KLASSEN: This is a problem of all of the lake States, and it is rather ironic that Illinois had to go to lengthy court proceedings to keep from being forced to put all of the Chicago sewage back into the lake, which would undoubtedly be a major contributor to the aging of the lake, and now Illinois and Indiana are being asked to spearhead this whole lake problem.

I don't mind being in the forefront of getting something done, but I think that it certainly is a responsibility of the Federal Government to get particularly Wisconsin into this picture.

MR. STEIN: I would agree.

Mr. Klassen, I know you went through lengthy proceedings and a lot of expense here, but you know on both sides of the operation, the United States did not have to enter this case. But we did enter the case as a party at considerable expense to the United States. As you know, the record will show that we supported the position of not putting wastes into the lake. I think this is a State-Federal program.

Now, let's see if I understand the statements here, because I think we might be saying the same thing.

What you are saying is the cladophora is an indicator of perhaps an excessive nutrient problem which is changing the character of the lake. If this is so, then it becomes a lake-wide problem. To get together on this, we should try to find a means or a forum for all the contributors to the nutrient problem. This will include other lake States and the Federal Government.

Now, whether the enforcement technique or another technique is the one for it, I am not entirely sure. But, I think you are right, Mr. Klassen, this should certainly be established to include those other States.

MR. KLASSEN: Where does the newly created Great Lakes Commission enter this picture? Don't they have some authority in this?

MR. POSTON: The Great Lakes Basin Commission?

MR. KLASSEN: Yes. This is something they could start working on.

MR. POSTON: They are a planning agency and would certainly be involved in this, to get something stimulated to do necessary research and study as to what can be done.

MR. KLASSEN: My whole point is that the finger is always pointed here. Illinois has taken the lead on preventing lake dumping, which, in my opinion, is a necessity, but it is a drop in the bucket compared to what the other States are putting into the lake, and they have not been in this picture at all, and I think that if we are going to get into a Lake Michigan problem, it is time that we get one of the major contributors of pollution, and I mean Wisconsin, into this thing with us.

MR. POSTON: Are you inferring, Mr. Klassen, that this should be a Lake Michigan enforcement action and expanded to the whole of the lake?

MR. KLASSEN: I am only saying that all of the States that are contributing should be involved in this.

Maybe we should take the lead on this, but I just raise the question whether it is entirely within the purview of this conference.

This is a legal question and I will defer to the Chairman.

MR. STEIN: Here we go.

You know, I made a remark to our young engineer before, but, you know, Mr. Klassen and Mr. Poole as engineers are probably two of the best water lawyers in the country.

MR. KLASSEN: That's bringing up a controversial subject, Mr. Chairman.

(Laughter.)

MR. STEIN: Do you know what the favorite topic of the engineers is at water pollution control conferences when they have their professional or national meetings? It is largely law, and not engineering.

However, Mr. Klassen, you have raised several pertinent points.

I think this should be kept in mind. The first is: There is something very paradoxical about this water pollution control business. That is, the State and the city which are doing the best job often get a lot of criticism and have the brunt of the problem, because they do the best job in pointing out these problems.

Now, we saw something this morning indicative of that -- this surveillance survey they did while the corrective remedial program was going on.

It is fair to say that in most cities, most industries and most States, they order a remedial facility and no one checks to see if it works.

The points is that as far as the lower end of Lake Michigan, Chicago, Illinois and Indiana are concerned, I know of no place in the country that is ahead of you in the program. But when you finally go out and make the checks that no one else does and you come up with results that may not be too appetizing, then you invite criticism. However, if you are going to preserve the water resource, there is no other way to do it.

I fully agree that if we are going to get into this nutrient problem, this should be considered from the standpoint of the area as a whole.

As you noted from the telegram that Mr. Udall sent, he is very much interested in a program to preserve Lake Michigan, and the nutrient problems will be presented to him.

Whether the enforcement route is the one to be taken, I cannot say. But these eminent engineer-lawyers on my left know the law as well as I do. If the Governor of either Indiana or Illinois requested it, under the law, we would be required to extend the case to include the other States.

MR. KLASSEN: You can do it without a request from the Governor. You have all the data and under Section 8(b) you could call such a conference.

MR. STEIN: We sure could do it without his request, but we would have to if the Governor did request it.

If this were something that Illinois wanted, this would be a very simple matter. The law is very clear. We have no option if the Governor requests it. We have to do it.

MR. KLASSEN: My point is that you can do it on your own if you feel the problem warrants it.

MR. STEIN: Yes.

MR. POOLE: I started all this, Mr. Chairman, with a little innocent question, and while the debate has been going on I have looked into the record, and I think that we have the same criteria, or essentially the same, for the waters that are under the jurisdiction of this conference, as the Lake Erie technical group and the conferees on Lake Erie agreed upon.

I concur wholeheartedly in what my friend from Illinois is saying, that this is a lake problem. I would hope that we could interest the States of Michigan and Wisconsin in this, short of an expansion of the conference, but I do concur in your recommendation that it is something that we have got to keep looking into and keep on top of.

It is my personal conviction that the day is not very far around the corner when anyone who is putting treated sewage into Lake Michigan would be removing the phosphorus -- at least, as much of it as he possibly can.

MR. STEIN: Thank you.

Are there any further comments or questions on the cladophora question?

(No response.)

MR. STEIN: By the way, just because we leave a topic does not mean it is closed. At any appropriate time, comments may be made.

If not, would you comment on the alewife situation?

MR. COOK: Dr. Roland Smith of the Bureau of Commercial Fisheries is going to give a presentation on the alewives, but we have some pretty nice slides here, so I will show you these prior to his presentation.

First slide, please.

This (indicating) is the Ohio Street Beach in Chicago on the 19th of June of this year.

Next slide.

This (indicating) is the 79th Street Greenville Beach, between the City of Chicago South District Filtration Plant and the United States Steel South Works. All these little white things are fish.

Next slide, please.

This (indicating) is the Belmont Harbor, Chicago, same time, same date.

Next slide.

This (indicating) is at Foster Avenue, North Side.

Next slide.

G. Cook

This (indicating) must be Belmont Harbor too -- it is one of the Chicago harbors.

Next slide.

Beverly Shores is over by Michigan City. They are using a deodorant there to hold down the odor. As some of you know, the odor that came from this was unbearable.

Next slide.

Here (indicating) the kids are helping clean up over at Beverly Shores.

Thank you.

MR. STEIN: One of the increments of moving the Federal water pollution control program into the Department of the Interior was that we would have even closer relationships with the Fish and Wildlife Service and the Bureau of Commercial Fisheries. On related water problems, such as the alewife problem, we can call them or members of the other bureaus.

As I understand the alewife problem, it is by no means certain and, as a matter of fact, it is more than doubtful that pollution causes the death of the alewives. However, after they die, they surely cause a pollution problem.

The Fish and Wildlife Service has been successful in dealing with other problems, notably that of the lamprey. Perhaps the way to control the alewife problem may come from a discipline or a group of disciplines which are somewhat different than the ones usually employed by water pollution control agencies, city, State or Federal.

With that, we would like to call on Dr. Roland Smith of the Bureau of Commercial Fisheries to give us an analysis of the problem and a possible prognosis of where we go from here in trying to solve it.

Dr. Smith.

STATEMENT OF DR. ROLAND SMITH, ASSISTANT DIRECTOR FOR BIOLOGICAL RESEARCH, BUREAU OF COMMERCIAL FISHERIES, DEPARTMENT OF THE INTERIOR

DR. SMITH: My name is Roland Smith. I am Assistant Director for Biological Research of the Bureau of Commercial Fisheries.

Mr. Chairman, Conferees, Ladies and Gentlemen:

Mr. Stein, maybe I would like to request that you appear before our Congressional committees and Bureau of the Budget and make those fine remarks. Perhaps we could get some money.

MR. STEIN: On the record of my success in the past doing that, maybe you don't want me.

(Laughter.)

DR. SMITH: In this year when the alewife die-off in Lake Michigan has created so much attention nationally, it seems somewhat paradoxical to say that neither the alewife nor the problems caused by it are either recent or new to the Great Lakes.

Now, the alewife is an anadromous fish common to the Atlantic Coast, and it goes up our streams and spawns there, and then returns to the ocean. Normally, there are no die-offs in the marine population of alewives. However, the alewife has gotten introduced into some of our fresh water environment. It has gotten introduced into some of the lakes in New York, New Jersey and the Finger Lakes in New York, and it has gotten introduced into the Great Lakes.

We are not sure exactly how it did get into the Great Lakes. We know it was first recorded in Lake Ontario in 1870. Perhaps it came up the river, or perhaps it was introduced with a shipment of shad that was dumped into the lake at about that time.

In the early days, fish culturists tried to introduce all kinds of fish throughout our fresh water areas, and they dumped shad and other things into the Great Lakes as well, so we are not sure just how it did get into Lake Ontario.

After the alewife did get established in Lake

Ontario, the movement to the other lakes was slow. It seemed as though the Welland Canal was a rather significant barrier to the movement of the fish into the lake, after it was constructed in 1829. Contrary to popular belief, this canal did not provide this easy route that a lot of people have suggested. Its many locks that raise a ship 327 feet between Lake Ontario and Lake Erie imposed partial barriers, and the strong downstream currents created as the huge locks are repeatedly emptied are major deterrents to upstream migration, so it took about 100 years for the first sea lamprey, which was also in Lake Ontario, to get into Lake Erie, and it took about 58 years for the alewife to get into Lake Erie from Lake Ontario.

I have stressed the difficulty of fish passage through Welland Canal to point out that the construction of the St. Lawrence Seaway below Lake Ontario probably is not a major factor in fish moving between these two lakes.

When the alewife reached Lake Erie, it had free access to all of the other Great Lakes. It was first found in Lake Huron in 1933, in Lake Michigan in 1949, and in Lake Superior in 1954.

The alewife was abundant in Lake Erie by 1942, but it has never become the dominant species. We are not entirely sure why it has not been the dominant species, but probably

R. Smith

it is because there has remained in Lake Erie a rather substantial population of predative fish.

Here is where we come into a very interesting story, and a very interesting relationship between the alewife and the lamprey eel.

Now, as the lamprey eel entered the other four lakes, it started to feed on many of the predative species, such as the lake trout and some of the whitefishes, and so on, and it has almost exterminated these predators in many of these lakes, particularly Lake Michigan.

This left a void here, and as the alewife moved into Lake Michigan, there was nothing to feed on the alewife. They would have been a natural forage fish for these predators, but there was nothing to feed on them, and consequently they literally exploded.

Furthermore, the alewife is an efficient feeder. It feeds on a variety of foods, and behavior studies at our biological laboratory at Ann Arbor suggest that, for some reason -- perhaps it has B.O., or what have you -- when it moves into an area, other fish will just move out of it without any belligerent action on the part of the alewife.

So they occupy space, and they also feed on food that other forage fishes are feeding upon. What is happening is that the alewife not only has exploded because of the lack of predators in some of these lakes, but it has also moved out some of the other perhaps more desirable forage fishes.

Now, the alewife has spread into Lake Huron and into Lake Superior. It is just beginning to get abundant there. Its future in Lake Superior is uncertain. The lake not only has a larger population of predators, but it is a colder water lake, and the alewife does not do as well in colder water.

As I mentioned, the alewife was first noted in the Lake Michigan area in 1953 and was abundant throughout the lake by 1956. During recent years, the adult population has been more than doubling each year.

Obviously, this can't go on forever, and within recent years there have been more and more die-offs noted on the lake.

The unusual magnitude of the die-off this year is, of course, related to the high density of the fish.

I might add that this alewife die-off is not only common to Lake Michigan. It has occurred in Lake Huron; it has been common in Lake Erie for at least fifty years; it is common in many of the Finger Lakes in New York, but the magnitude of the die-off in Lake Michigan this year was much greater than has ever occurred in previous years, much greater than we might ever have been able to predict, and much greater

R. Smith

than we would really expect.

And so, why was this unusual heavy die-off? Well, we are not sure. We have not had an opportunity to really study the entire ecological relationships in the Great Lakes, and so we can only speculate, but it seems as though, for one thing, the mid-lake temperatures during the winter were colder than usual.

Now, alewives do not tolerate very cold temperatures in fresh water. They are primarily a marine fish and they are not entirely adapted to the fresh water environment.

Consequently, when it gets to an environment that is a little bit critical, they can't quite adjust to it, and so cold water temperature and sharp temperature gradients are things that the alewives cannot tolerate.

Our scientists noticed that contrary to usual years, there was an alewife mortality that started in mid-winter of this year. We don't know exactly when it started, but we know that it did occur in the winter, and this mortality continued. We know that there was a rather extreme temperature gradient between the middle of the lake and the shoreline areas this year, and we feel that possibly this was a factor, so that perhaps a combination of hydrological conditions along with the normal die-off associated with the alewives probably contributed to this very exceptionally high level of mortality this year.

The question is: Will the mortality occur in future years? I think we can say without hesitation that we can expect mortalities in future years. I don't think that we can expect a series of environmental conditions next year or the year after that would cause perhaps as serious a mortality as occurred this year, but there will continue probably to be some serious mortalities.

Now, what are we going to do about this? Well, Secretary Udall was concerned enough to appoint a task force, as you have already heard, to make recommendations for alleviating the problems in the Great Lakes, and particularly Lake Michigan.

The task force looked into available data on the possible causes of the alewife die-off, and, as you have already heard, there is no evidence that pollution is directly contributing to this excessive alewife die-off.

The task force has recommended a program of research and development that will have an immediate pay-off, we hope, and provide a long-term solution to the alewife problem.

Basically, the task force report is in three parts. The first part would be sort of a monitoring program to determine when the alewives are concentrating in any given area of the lake, whether or not there is a mortality pending, whether or not it is going to be a mortality of high magnitude, and, hopefully, to alert the local municipalities and States to be ready for it.

The second is a program in research and development of techniques and efficient ways of removing dead and dying fish from the water or on the beaches.

Thirdly, the task force believes that the ultimate solution to the alewife mortality problem is to reduce this population to a level where it no longer is of a sufficient quantity to create this problem, and perhaps even to eliminate the fish entirely, although this is probably impossible to do now.

The way this is to be done is gradually to reintroduce other species of fish, other predators, and continue necessary commercial fishing, to gradually reduce the alewife population, and, at the same time, introduce other predatory species and other forage fish to take the place of the alewife. This is a much longer program and requires a much greater knowledge of the entire lake environment.

The idea, of course, would be to do this for the entire Great Lakes and, hopefully, return the Great Lakes to its earlier species complex.

Thank you very much.

MR. STEIN: Thank you, Dr. Smith, for a very lucid explanation of the alewife problem.

Are there any comments or questions?

MR. KLASSEN: I have one question.

MR. STEIN: Mr. Klassen.

MR. KLASSEN: I had read in a newspaper account, Dr. Smith, that there had been control facilities proposed in the St. Lawrence Waterway that would have cost only a million dollars, and they were eliminated because of economies.

Apparently, from what you said, this would not have materially affected the problem?

DR. SMITH: No. In fact, as far as the specific alewife problem is concerned, this problem was on its way to producing these kinds of conditions long before the St. Lawrence Seaway got under way. The environment was developing the conditions for this increased population.

MR. KLASSEN: Just one other comment. I am just checking these things.

They are so abundant and travel in such large schools that when they get into an area to feed, there is insufficient food, and therefore a lot of them die from starvation. Is this a layman's interpretation?

DR. SMITH: No. This could be a factor. We haven't studied enough about the alewife in this particular condition to know whether or not this might be a factor, but it could very well be that one of the contributing causes of this mortality is a lack of food in certain areas.

On the other hand, they have got to cover quite a large area here, because they could conceivably move to other areas of the lake where there is food, so I wouldn't rule it out, but, on the other hand, I am not sure that it remains a factor.

MR. STEIN: Mr. Poole?

MR. POOLE: I didn't hear you mention commercial fishing pressure as one of the elements of control. I have heard that discussed.

DR. SMITH: Yes, I did mention it.

MR. POOLE: Did you? I beg your pardon.

DR. SMITH: I think that increased commercial fishing will, for a time, be very desirable in controlling the alewife population.

Ultimately, of course, we hope to reduce the alewife population, and then, of course, there won't be a commercial fishery for them -- hopefully, something better.

MR. KLASSEN: Is it a fact that you are going to harvest them and turn them into fish meal?

DR. SMITH: Well, I can say that it is possible to do this, and they are, in fact, being made into fish meal now.

Is that right, Mr. Premetz? Mr. Premetz is

Assistant Regional Director for this region and is backing me up here in case I get stumped.

They are making fish meal out of it now, but to expand this program to a very significant degree, I think should be considered with caution here, because we may not have -- I hope we are not going to have these large numbers of alewives in a few more years from now.

MR. POSTON: When may this report on the alewife situation by the Secretary's committee be anticipated?

DR. SMITH: It should be released early this week. It has gone up to Secretary Udall. I think early this week.

MR. STEIN: Mr. Bacon?

MR. BACON: I take it that the fish is now native to the fresh water lake. What is its life cycle, reproduction, and how old does it ordinarily get, and size?

DR. SMITH: Well, in marine waters the alewife gets to be six or seven years old and gets to be up to 14 inches, and it runs up the stream to spawn several times in its life.

In fresh water, because this is not its natural environment, because there are physiological processes which have not been quite evolved yet to permit the fish to really be efficient in fresh water, the life cycle is much shorter.

Three to four years is the average maximum life span, and generally they spawn only once in their life. They don't grow anywhere near as large. In some of the New Jersey lakes, I know six inches is a good large size for alewives. In the Great Lakes, I suspect maybe seven or eight inches is probably the maximum size they get, so they don't get as large in fresh water, generally speaking, nor do they live as long.

MR. BACON: We then probably saw the adult fish, the size we were looking at?

DR. SMITH: Yes, these were adult fish, but the other interesting thing was that they were three-year-old fish, and the older fish are primarily the major population, and these were the bulk of the fish that were killed. There were also some one-year-old fish, and maybe 25 percent of these were one-year-old fish, but there were very few two-year-old fish, and we don't know what happened to the two-year-old fish, although we have evidence that they are still around, so maybe they occupied a different level of the water during this period. We don't know.

MR. POSTON: I noted that in Upper Lake Michigan they had a bigger alewife. Does this mean a different species of alewife?

DR. SMITH: No. I don't know the reason, except probably I would suspect that better food conditions would be my first guess, but I think that we would have to study this in more detail to know.

MR. BACON: Doctor, did anyone make an estimate as to what kind of a pollutional load this die-off caused in terms of phosphates or nitrates?

DR. SMITH: I would have to ask Mr. Poston that.

MR. BACON: You know, we are always trying to keep these problems in perspective, the big ones and the little ones alike, but I am interested in hearing someone say what kind of a pollutional load did this die-off represent, whether they take it from a nitrate point of view or a phosphate point of view.

MR. POSTON: We might ask Grover Cook to comment on this.

MR. COOK: Well, the alewife is a plankton feeder, and if alewife **weren't** there, the plankton would be there. The plankton would grow and die off naturally without anything feeding on them, so the same biomass is present regardless, whether the alewife is there or not.

MR. BACON: In other words, the phosphorus goes from the plankton to the fish.

MR. COOK: Right.

MR. BACON: And it is no addition. Now, it might redistribute this material. Fish that may have died in the northern part of Lake Michigan may have moved down here and settled at the bottom, and may have increased the load in this part of the lake. We don't really know, but the same biomass is present.

DR. SMITH: Of course, you did get a more immediate release of the nutrients, and so on.

MR. STEIN: Are there any further questions?

MR. BACON: Yes, I have one more.

MR. STEIN: Yes, surely.

MR. BACON: Where do these fish breed, in the rivers, feeding streams, in the deep water or shallow water?

DR. SMITH: They breed in shallow water on reefs, and I guess in larger lakes they also went up the stream to spawn.

MR. STEIN: Are there any further questions or comments?

(No response.)

MR. STEIN: If not, thank you very much.

Let's try to get one more statement in, and I think this is the last one on water quality. This afternoon we probably can hear from the States and the District on their programs.

We will now hear from James C. Vaughn.

Mr. Vaughn.

STATEMENT OF JAMES C. VAUGHN, ENGINEER OF WATER PURIFICATION, BUREAU OF WATER, DEPARTMENT OF WATER AND SEWERS, CITY OF CHICAGO, ILLINOIS

MR. VAUGHN: Mr. Chairman, Conferees and Ladies and Gentlemen:

I am James C. Vaughn, Engineer of Water Purification in the Bureau of Water, Department of Water and Sewers, in the City of Chicago.

Over the years there has been a continuing and steady decline in the quality of the raw water in the southern end of Lake Michigan. Numerous reports and papers have described this decline in considerable detail.

In March 1965, the Federal Water Pollution Control Administration for the Calumet Area and the Southern End of Lake Michigan, held a conference in Chicago in which the nature and degree of pollution were reported upon by a number of groups concerned. Mr. H. H. Gerstein, then Chief Water Engineer of the Bureau of Water in the Department of Water and Sewers, City of Chicago, reported upon the quality of water in Lake Michigan and its tributaries as revealed by regular surveys of these waters conducted by the Water Purification

Division over the past twenty years. The conferees following this meeting established a Technical Advisory Committee which was assigned the task of drawing up the criteria by which the water quality of Lake Michigan and its tributaries would be evaluated. This committee held a total of 24 meetings under the chairmanship of F. W. Kittrell and agreed on 24 parameters. These were adopted as official by the conferees in a meeting in January 1966.

It was hoped that the passing of the Federal Water Pollution Control Administration Act in 1965 and the activities of the conference would result in a definite and immediate improvement in raw water quality. However, this has not been the case. On the contrary, there has been a steady deterioration of the raw water quality, especially with regard to the "open waters" of Lake Michigan. In Table 1 we have tabulated the average and maximum daily carbon doses, and the average and maximum ammonia nitrogen values for the raw water at the South Plant for the years 1965, 1966 and 1967 (Jan.-June), are shown. The average daily carbon dose rose from 23 lb/mg in 1965 to 43 lbs/mg for the first half of 1967. The maximum dosage in lbs/mg was 230 in 1965 and 400 for the first half of 1967. The average ammonia nitrogen was .017 ppm in 1965, .028 in 1966, and .038 for the first half of 1967. This means that this value has more than doubled in two and one-half years. The maximum ammonia nitrogen values were .111 ppm in 1965, .126 ppm in 1966, and .376 ppm in the first half of 1967. This represents a steady and rapid degradation in the quality of the raw water at the intake of the South Plant. The lower half of the table shows the similar values for the Central Plant.

While the average carbon dose did not show much variation, the maximum carbon dose does show a very sharp increase. This is also true of the average and maximum ammonia nitrogen values. Two incidents occurred at the Central Plant which are very significant in estimating the quality of the raw water received at this plant. During one of the high hydrocarbon waste periods at the South Plant, a slug of pollution migrated as far north as the intake of the Central Plant. It was during this period that the maximum carbon dosage of 104 lbs/mg was reached. The maximum ammonia nitrogen value of .138 ppm was reached during this period also. On another occasion, an organic waste entered the lake from a point 40 miles north of Chicago and migrated down the lake as far as the intake of the Central Plant. This material has the property of not being detectable in the raw water, and causing very disagreeable, musty, moldy odors in the distribution system several days after leaving the filtration plant. Each municipality, in turn, from North Chicago south to

Chicago, experienced this difficulty and warned its southern neighbor.

By reducing the amount of post-chlorination, this musty, moldy taste was minimized and after a short time, passed out of the system. Another experience at the Central Plant involved the presence of a high chlorine demand over a prolonged period of time, approximately six weeks. This was due to the presence of a high ammonia nitrogen content. This resulted in an average chlorine demand for April of 25 lbs/mg and for May of 22.2 lbs/mg. The maximum figures for these months were 34.7 lbs/mg for April and 35 lbs/mg for May. The general range of chlorine demand for previous years at this plant was in the 10-20 lb/mg range.

Of the 24 parameters adopted as official in January 1966 by the conferees of the Federal Water Pollution Control Administration for the Calumet Area and the Southern End of Lake Michigan for open waters, the control point for these criteria being the raw water header of the South Plant, four parameters are considered important as related to tastes and odors. They are threshold odor, ammonia nitrogen, phenol-like substances and total phosphates. The latter being significant because of their contribution to the growth of plankton and the ultimate effect of this plankton on tastes and odors.

Table 2 shows the days on which these values were exceeded during 1965, 1966 and January-July period of 1967. In threshold odor, the daily average value of 4 was exceeded in 7 days in 1965, 52 days in 1966, and 40 days for the first seven months of 1967. The single daily value of 8 was exceeded on 4 days in 1965, 37 days in 1966, and 14 days for the first seven months of 1967. The ammonia nitrogen daily average value of .05 ppm was exceeded 26 days in 1965, 43 days in 1966, and 54 days in the first seven months of 1967. No figure is given for the annual average. The value of .003 ppm for phenol-like substances (this test was only run once each day) was exceeded 48 days out of 74 days in 1965, 224 days out of 365 in 1966, and, however, only 7 days out of 164 for the first seven months of 1967. The total phosphates were also run only once each day. The single daily value of .04 ppm was exceeded in 34 days out of 166 in 1965, 43 days out of 258 in 1966, and 106 days out of 192 days in the first seven months of 1967. The steady increase of these values represents a progressive deterioration of raw water quality in the southern end of Lake Michigan.

In Table 3 we have also tabulated the average and maximum carbon dosage, and the average and maximum ammonia nitrogen values for the raw water at the South Plant for the years 1962 through 1966, and for the first six months of 1967.

In addition, this table shows the number of days each year in which the total carbon usage at the South Plant exceeded 30,000 lbs. It must be recognized that the handling of this much carbon in itself represents a tremendous problem. If we were still using bag carbon, the task would be much more demanding. Each 100 lbs. would represent 3 bags of carbon; each thousand lbs., 30 bags; and 30,000 lbs. would represent 900 bags. The disposal of this many empty bags would in itself be a major undertaking. The increase in the number of days each year, particularly in 1966 and for the first six months of 1967 in which 30,000 lbs/day was exceeded, indicates a rapid deterioration in the quality of raw water received at the South Plant. Examination of the other values in this table shows the same progressive deterioration in the quality of the raw water.

The increase in the use of the three critical chemicals -- coagulants, carbon, and chlorine -- have resulted in a steady and sharp increase in the chemical costs in treating raw water in Chicago. Some of this increase in cost has, of course, been due to a slight increase of prices in the chemicals delivered. The bottom part of Table 3 shows the contract prices delivered for alum, carbon, and chlorine.

Those prices have increased as follows: Alum in 1965, $39.95 per ton delivered; 1966, $40.55 per ton, and the first six months of 1967, $41.85 per ton.

Activated carbon delivered in bulk powder, $156.70 per ton in 1965 and 1966, and it went up to $166.60 per ton in 1967.

Chlorine has increased from $83.20 per ton delivered in 1965 to $97.20 per ton delivered in 1967.

These price increases account for part of the total cost increase but by far the vast majority of the increase is due to the degradation in the raw water quality.

Nowhere has it been stated that one can determine the cost of removing one threshold odor unit of a given odor characteristic. In the two Chicago filtration plants, each supervising engineer is held responsible for producing a treated water that is always palatable, with a maximum threshold odor of 15. This results in quite a variation of interpretations of the required dosage. It is known that volatile hydrocarbons and kerosene-like odors require the lowest dosages of activated carbon while the musty chemical odors and specific chemical wastes require the higher dosages. In general, the requirements range from 1 ppm to 4 ppm of activated carbon for each threshold odor unit removed.

The rapidly accelerating rate of decline in the quality of the raw water at the southern end of Lake Michigan is reflected in the rapidly accelerating costs of producing a satisfactory treated water from this source.

While it is still possible, although increasingly expensive to produce a satisfactory finished water, it may be that we are rapidly approaching the point where with present treatment facilities it will be extremely difficult if not impossible to produce a satisfactory and acceptable finished water in the years ahead.

Thank you.

MR. STEIN: Thank you, Mr. Vaughn.

Are there any comments or questions?

MR. BACON: I have one.

MR. STEIN: Yes, Mr. Bacon?

MR. BACON: What portion of your total cost of treatment per million gallons would the chemicals represent, 5 percent, 10 percent, or what would it be?

MR. VAUGHN: The cost of treatment is primarily the cost of chemicals, and my guess is that the chemicals run from 10 to 20 percent of the total cost of the water at the outlet of the plant.

MR. BACON: Thank you.

MR. STEIN: Are there any other comments or questions?

(No response.)

MR. STEIN: This indeed is a disturbing report and I think we should not underestimate its

TABLE 1

ODORS, AMMONIA NITROGEN (NH_3-N) AND CARBON DOSES
South Water Filtration Plant
1965,1966, and Jan.-June, 1967

Year	Average daily carbon dose (lb/mg)	Maximum daily average carbon dose (lb/mg)	Average [1] ammonia nitrogen	Maximum ammonia nitrogen
1965	23	230	0.017	0.111
1966	33	328	0.028	0.126
1967 Jan.June	43	400	0.038	0.376

[1] Raw Water Header

ODORS, AMMONIA NITROGEN (NH_3-N) AND CARBON DOSES
Central Water Filtration Plant
1965,1966, and Jan.-June, 1967

Year	Average daily carbon dose (lb/mg)	Maximum daily average carbon dose (lb/mg)	Average [1] ammonia nitrogen	Maximum ammonia nitrogen
1965	23	36	0.014	0.101
1966	20	24	0.017	0.132
1967 Jan.June	22	104	0.027	0.138

[1] Raw Water Header

TABLE 2

DEPARTMENT OF WATER AND SEWERS
CITY OF CHICAGO
CONTROL POINT - OPEN WATER
SOUTH DISTRICT FILTRATION PLANT
1965, 1966, 1967 (Jan.-July)
COMPARISON OF ACTUAL RESULTS WITH WATER QUALITY CRITERIA GOALS

PARAMETER	QUALITY CRITERIA		ANNUAL					
			Exceeding Daily Average			Exceeding Single Value		
			1965	1966	1967	1965	1966	1967
Threshold Odor	Single Value	≯ 8				4/365	37/365	14/212
(Hydrocarbon and/or Chemical)	Daily Average	≯ 4	7/365	52/365	40/212			
Ammonia Nitrogen	Annual Average	≯ 0.02						
(mg/L)	Daily Average	≯ 0.05	26/365	43/365	54/212	-	-	- -
Phenol-like Substances	Annual Average	≯ 0.001						
(mg/L)	Single Value	≯ 0.003	-	224/365		48/74	-	7/164
Total Phosphates	Annual Average	≯						
(mg/L)	Single Daily Value	≯ 0.04	-	43/258		34/166	-	106/192

(No. of days exceeding criteria/No. of days tested)

LEGEND:
≯ Not more than
> More than
< Less than
≮ Not less than

TABLE 3

ODORS, AMMONIA NITROGEN (NH_3-N) AND CARBON DOSES
South Water Filtration Plant
1962-1966, and Jan.-June, 1967

Year	No. of days of over 30,000 lb carbon use	Average daily carbon dose (lb/mg)	Maximum daily average carbon dose (lb/mg)	Average [1] ammonia nitrogen	Maximum ammonia nitrogen
1962	6	21	192	0.010	0.102
1963	12	23	252	0.023	0.140
1964	19	27	361	0.026	0.203
1965	7	23	230	0.017	0.111
1966	30	33	328	0.028	0.126
1967) Jan.-June)	24	43	400	0.038	0.376

[1] Raw Water Header

CONTRACT PRICES PER TON
Central and South Filtration Plants
1965,1966 and Jan.-July, 1967

Year	Chemical Alum (Liquid)	Carbon	Chlorine
1965	$39.95	$156.70	$83.20
1966	40.55	156.70	95.20
1967) Jan-July)	41.85	166.60	97.20

significance.

Before we get into the bad part, I must say I have tasted your water again. I have looked at this professionally and Chicago has always put out one of the best municipal water supplies in the country. Despite cost, you are doing a very good job. Your water is just fine.

The problem is -- and this will become increasingly evident -- that we have a situation here in which there really isn't any difference among the States, the Federal Government, the municipality and probably the industries concerned on the goals of the program. We find little difference on the measures and what we are to do. The difference is on details.

Now, the points is, despite this, maybe we are not making the progress we should. If we are slipping back and losing it, maybe we are not doing enough. Possibly we don't have all the elements to it.

This is really the problem we have to face in this area. It may be a greater Lake Michigan problem -- I don't know. I will say that I think we probably have the best State-Federal-municipal-industrial program for pollution abatement in this area, or as good as we have in the country. It is probably more advanced than most.

If we are still getting these results, maybe we have to take another hard look. This is not a case in which we are battling each other, or there is a difference of opinion. This is a case in which everyone is working the best he can.

The report gives us a lot of food for thought, and I think we are going to have to think long and hard about what we are doing when we get something like this.

MR. VAUGHN: Mr. Chairman, if I may refer to cladophora for a moment, we are having increasing difficulties each year with the cladophora torn loose from the bottom of the lake by the storms and collecting on our screens. It is costing us more and more each year to clean those off.

MR. STEIN: Right.

MR. POSTON: One other question.

I know that you have intakes at the cribs out in the lake and you have a shore intake.

MR. VAUGHN: Yes.

MR. POSTON: Is there a marked difference between the waters in the two?

MR. VAUGHN: On rare occasions, the difference is sharp, and at the South Plant we shifted back and forth, I think about ten or twelve times in the two years, from one intake to the other, but normally we run a little of both all of the time. That is why the Technical Committee picked that rather than the crib or shore intake, because that represents a mixture of the waters we treat.

MR. POSTON: You normally take from both? You have no evaluation as to what kind of difference you get?

MR. VAUGHN: We measure the quality of each water and the number of parameters each day. Normally, the shore water is not as good as the crib water, but on frequent occasions the crib water is much worse than the shore water. That is why we shut off the crib and open up the shore, and we shift back and forth.

At the Central Plant we can't do that yet. We are not connected to the crib, but we hope to be in another year. We have the shore intake, which is again several thousand feet from the shore line.

MR. POSTON: Well, I think yours was a very impressive report here.

MR. VAUGHN: Thank you very much.

MR. STEIN: Thank you, Mr. Vaughn.

Are there any further comments or questions?

(No response.)

MR. STEIN: Thank you for a very, very enlightening report.

Let me just make this point once again. I hope this gets across. In an electric utility, a water utility or a telephone utility, when you put something in and it doesn't work, you begin to get complaints. That is, on a winter day when the men are putting their lights on in the office and the ladies are putting on the appliances at home, if the light doesn't go on, there are loads of complaints. If you don't get a telephone connection, there are loads of complaints, or if Mr. Vaughn puts water out with a taste or odor problem, I am sure the phone doesn't stop ringing.

The problem with water pollution control is, once we put in the system, there really are very few indicators of complaint.

Now, one of the best groups of consumers is the water companies who are processing the water. The others are the groups here who are doing the surveillance.

In very few parts of the country do we have accurate records or the analytical capability which we have in Chicago, both in the Water Department and in doing the surveillance; so the fact that this is showing up indicates a reflection of probably the most sophisticated program in the country, and this is something we should keep in mind.

However, I think with all of us we have to follow the facts where they are going to take us, whether we like them or not, because the waters won't know the difference, and if we don't do the job, they are going to deteriorate and we are going to have a real problem.

Are there any further comments or questions?

(No response.)

MR. STEIN: If not, we will recess until 1:30 for lunch, and then we will continue with the States and District presentations.

(Whereupon, at 12:00 o'clock noon, a luncheon recess was taken.)

AFTERNOON SESSION

(1:40 p.m.)

MR. STEIN: May we reconvene?

We will now call on Mr. Poole of Indiana for a progress report.

Before we begin, I have a letter here we should read into the record, dated September 11, 1967. This is addressed to me:

"The undersigned, Chairman of the Water Pollution and Water Resources Commission of the State of Illinois, asks that in addition to the agenda published for your conference in the newspapers in regard to industrial pollution of the rivers and canals in the Chicago land area, that you also consider a prohibiting against dumpings of any dredgings into Lake Michigan whether from the State of Illinois, or the states of Indiana, Wisconsin, or Michigan.

"Lake Michigan is the most precious possession which the bordering states have because of the abundance of water for both domestic and industrial use.

"The Lake must remain available and must not fall into the same state of pollution as Lake Erie.

"Your attention to this matter would be appreciated.

"Very truly yours,

/s/ Carl L. Klein,

Chairman."

Mr. Poole?

MR. POOLE: I will just introduce Perry Miller, whom all of the regulars of this conference are acquainted with already. He will present our report.

STATEMENT OF PERRY E. MILLER, ASSISTANT DIRECTOR, DIVISION OF SANITARY ENGINEERING, INDIANA STATE BOARD OF HEALTH, INDIANAPOLIS, INDIANA

MR. MILLER: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is Perry Miller. I am Assistant Director of the Division of Sanitary Engineering, Indiana State Board of Health, and am making this statement on behalf of the Indiana Stream Pollution Control Board.

The Indiana Stream Pollution Control Board has continued efforts to comply with the recommendations of the conferees.

The Board promulgated the water quality criteria adopted by the conferees for water covered by the conference. In addition, criteria were developed and promulgated for the Indiana Harbor Canal with the control point at the inner harbor light.

In compliance with the Federal Water Quality Act of 1965, the criteria and plans of implementation were submitted to the Secretary of the Interior on June 15. The Secretary approved the interstate standards on July 18, 1967.

The Plans of Implementation state the Board will require the following:

1. Expansion of treatment facilities will be required by Hammond on or before the end of 1972. (Hammond will have to provide up to 95% treatment to meet water quality requirements in the Grand Calumet River.)
2. Installation of advanced waste treatment will be required at East Chicago, Gary, Hammond and Michigan City as soon as practicable.
3. The municipalities of Hammond and Whiting will be required to provide treatment and disinfection of sewage and storm water overflows from the Robertsdale, Atchison Avenue, and Front Street outlets to Lake Michigan on or before the end

of 1970. The municipalities of East Chicago, Gary, Hammond, and Michigan City with storm and/or combined sewer overflows will be required to provide disinfection and control of pollution from these overflows as soon as practicable.

4. Secondary treatment will be required at all new installations.

All industries will be required to provide a degree of treatment or control that is equivalent to that required of municipalities on the same stretch of the stream. Except in rare instances this will be the equivalent, at least, of secondary treatment. Exceptions must be justified to the satisfaction of the Indiana Stream Pollution Control Board and the Federal Water Pollution Control Administration.

Municipal Sewage Treatment

All sewage treatment plants serving Indiana municipalities in the conference area provide secondary treatment and effluent chlorination. Projects completed since the first convening of the conference in March 1965, include new sewage treatment plants, including effluent chlorination at Dyer and Schererville; plant expansion at Crown Point; effluent chlorination facilities for Hammond, Gary, and East Gary and improvements to chlorination facilites at East Chicago and Valparaiso; and completion of a sewer project and connection to the Gary Sanitary District for the Merrillville Conservancy District. The Merrillville project now has approximately 750 service connections serving an estimated 4,000 population equivalent.

Interceptor sewer projects under construction by the Hammond Sanitary District and the Town of Highland will provide for the discharge of all sewage to the Hammond Sanitary District that now is discharged to the Little Calumet River.

The Stream Pollution Control Board order, which requires the Town of Porter to provide adequate sewage treatment facilities, has been referred to the Attorney General for enforcement.

The Town of Portage has authorized its engineers to proceed with the design of a sanitary sewer system and sewage treatment facilities. The Hammond Sanitary District has received a preliminary report from its consulting engineers on expansion of its sewage treatment facilities and consulting engineers for the Town of Dyer and Griffith are investigating the feasibility of sewer separation.

The section on Industrial Waste Treatment provides details on the additional industrial wastes that are being discharged or proposed for discharge, to the East Chicago, Gary, and Hammond Sanitary District plants. The possible effects on the Districts' plants and effluents are receiving consideration prior to acceptance by the respective Districts of these industrial wastes.

Semi-Public Sewage Treatment

Increased surveillance of semi-public installations continues to improve operation of facilities. Efforts also continue towards obtaining connections to municipal sewer systems and effluent chlorination where municipal connections are not feasible. Tertiary treatment (7-day terminal lagoons) is now required of most new installations.

Eighteen plants are providing effluent chlorination and plans have been approved for chlorination facilities at five other plants. Five plants include, or have plans approved to include, tertiary treatment in the form of a 7-day terminal lagoon.

Negotiations are in progress for the connection of five developments to the Merrillville Conservancy District sewer system. Plans for such a connection have been received for Turkey Creek Meadows Subdivision and the Independence Hill area. Future municipal connections are possible for four other developments.

Industrial

Twenty-seven industrial plants have established effluent monitoring programs and one industry (Adolph Plating, Inc., East Chicago) has yet to accomplish this. Routine monitoring programs were not required of Vulcan Detinning Division, Vulcan Materials Company, U.S.S. Lead Refinery, Inc., General American Transportation Corporation, American Steel Foundries, Inc., Commonwealth Edison Company, Union Tank Car Company, and Berry Refining Company.

Sixteen industrial plants have adequate waste control facilities; ten have adequate waste treatment or control facilities under construction and/or proposed; five have additional waste treatment facilities under construction but additional treatment or control will be needed; two are negotiating to connect to sanitary district's sewerage systems; one needs additional waste treatment or control facilities; and one plant is no longer operating.

Officials of industrial plants have agreed to completion of treatment facilities on or before December 31, 1968, with the exception of certain facilities at four steel plants. The latest completion date for facilities at steel plants is June 30, 1970.

Further reduction of threshold odor substances, oils, and BOD will be required at the four oil refineries and reduction of threshold odor substances at Union Carbide Corporation.

Industrial Waste Treatment

Grand Calumet-Indiana Harbor Canal-Lake Michigan

Vulcan Detinning Division, Vulcan Materials Company, Gary

Inspections by representatives of the Board show that adequate waste control is being maintained.

Cities Service Oil Company, East Chicago

The company is investigating methods of additional waste control. The process water is mixed with a large amount of cooling water prior to discharge to the Grand Calumet River and the concentration of contaminants in mg/l is small. The company will be required to provide additional reductions in BOD and threshold odor-producing substances.

E. I. duPont de Nemours & Co., Inc., East Chicago

The company has expanded its monitoring program to include flow measurements on all outfalls. The results of the monitoring program show that concentrations of suspended solids, acidity, and zinc are significant. On September 1, 1967, the zinc ore roasting operation at the plant was terminated and the source of zinc contamination eliminated. The company's plans consist of improvements to the existing acid neutralization facilities and the existing clarification facilities for settling diatomaceous earth filter aid from the Ludox operation. The company's pollution abatement program will be completed by December 31, 1968.

U. S. S. Lead Refinery, Inc., East Chicago

Inspections by representatives of the Board show that adequate waste control is being maintained.

General American Transportation Corporation, East Chicago

All wastewater continues to be discharged to the East Chicago Sanitary District's sewerage system. Adequate waste control is being maintained.

Blaw Knox Company, East Chicago

The company has completed its waste control program and is now providing adequate waste control. The following projects have been completed: insulation of the clariflocculator, installation of continuous sludge removal facilities on the clariflocculator, connection of roll grinder coolant waste flow to the East Chicago Sanitary District's sewerage system, and installation of a new wet dust collector on the No. 1 sand system. Consistent with the Board's policy requiring adequate waste treatment or control facilities for new process operations, filtration equipment will be installed to handle wastes from a new roll grinder. The effluent monitoring program has been expanded to provide satisfactory data on all outfalls.

American Steel Foundries, East Chicago

Inspections by representatives of the Board show that adequate waste control is being maintained.

Union Carbide Corporation, Linde Division, East Chicago

The results of the corporation's effluent monitoring program and inspections by representatives of the Board show that adequate waste control is being provided.

Mobil Oil Company, East Chicago

The company is investigating installation of an air flotation unit for additional treatment of the effluent from the API oil separator, the discharge of phenolic waste streams into the East Chicago Sanitary District's sewerage system, and additions to the API oil separator. The company will be required to provide additional reductions in BOD, oils, and threshold odor-producing substances.

Calumet Nitrogen Products Company, Hammond

The company's monitoring program for the first seven months of 1967 shows the following: flow, 0.22 mgd; ammonia-nitrogen 48 lbs.; and nitrate-nitrogen, 34 lbs. These values represent a 46 percent reduction in ammonia-nitrogen and 53 percent reduction in nitrate-nitrogen when compared to the 1966 annual average waste loadings. The company has virtually eliminated periodic high concentrations of ammonia- and nitrate-nitrogen previously experienced. Good housekeeping practices and good waste control management will maintain adequate waste control.

Union Tank Car Company, Whiting

The company has completed the recirculation system for tank car pressure testing waters and has started construction of a storm water diversion system and waste equalizing tanks and pumping station to separate storm water and wastewater and convey the wastewater to the Hammond Sanitary District's sewage treatment plant. The facilities are scheduled for completion during November 1967. Completion of the facilities will provide adequate waste control.

Sinclair Refining Company, East Chicago

On July 18, 1967, the Board approved final plans for construction of sewers, sump, pumps, and force mains to convey water drawoff from storage tanks in the north and south tank farm to the Ballast Oil Separation Tanks, a sludge dewatering tank to handle water treatment sludges, and two 55,000-barrel storage tanks and pumping station to pump and store storm water flow that exceeds the design capacity of the API oil separator, for later treatment through the oil separation facilities. The company is preparing plans and specifications for a presettling tank equipped with mechanical sludge and oil skimming equipment for installation ahead of the API oil separator. The proposed projects will be completed by December 31, 1968. Studies are being made relative to secondary treatment of the wastewater. The company will be required to provide additional reductions in BOD, oils, and threshold odor-producing substances.

U. S. Gypsum Company, East Chicago

The results of the company's effluent monitoring program and inspections by representatives of the Board show that adequate waste control is being maintained.

P. E. Miller

Youngstown Sheet and Tube Company, East Chicago

On July 19, 1967, final plans and specifications for waste treatment facilities for the No. 1 Tin Mill, No. 2 Open Hearth, and No. 3 Hot Strip Mill were approved by the Board. The plans propose the following:

Coke Plant

The company has completed in May of this year construction, which was completed ahead of the schedule proposed, which was June of 1967, of naphthalene scrubbers in the Coke Plant and connection of contaminated wastes from the Coke Plant to the East Chicago Sanitary District's sewerage system.

No. 2 Open Hearth

Construction of clarification and sludge handling facilities for treatment and reuse of 11,440 gpm of gas wash water and cooling towers to cool and reuse 14,580 gpm of gas cooling water. The facilities are to be completed by the end of 1967.

No. 1 Tin Mill - Waste Pickle Liquor System

Construction of sewers, sumps, pumps and storage tanks to collect and store waste pickle liquor for subsequent haulage by tank truck for disposal on a hot slag fill. The facilities are to be completed by October 1, 1967.

No. 3 Hot Strip Mill

Construction of primary oil and solids removal facilities, chemical flocculation and clarification, and sludge handling facilities for treatment of 3,000 gpm of oily wastes, primary and secondary scale pits for treatment of 9,600 gpm of roughing stand wastewater and 51,000 gpm of finishing stand wastewater, and pressure filters for filtration of the total wastewater flow. The facilities are to be completed during the first quarter of 1968.

The company has made substantial progress in the construction of facilities. The construction of facilities for disposal of pickle liquor from the No. 1 Tin Mill is about one year ahead of the schedule originally submitted and the Coke Plant facilities were also completed ahead of schedule. Final plans for the Buttweld Mill are to be submitted this year, and construction will be completed on December 31, 1968. Final plans for the Blast Furnace recirculation system are progressing satisfactorily, which will be completed June 30, 1970. The projects in the No. 1 Tin Mill, No. 2 Tin Mill, and Cold Reduced Sheet Mill are interceptor sewers to collect oil and additional work is required to prepare final plans for these sewers. These facilities are to be completed by December 31, 1969.

The North Lagoon will treat the effluent from the No. 3 Hot Strip Mill waste treatment facilities and the effluent from the No. 5 Stand of the Tandem Rolling Mill in the No. 3 Cold Reduced Sheet Mill. The North Lagoon will be completed by June 30, 1970.

The company's proposed waste treatment facilities should provide adequate waste control. The company is maintaining an adequate effluent monitoring program.

National Tube Division, U. S. Steel Corporation, Gary (Gary Tube Works)

On March 21, 1967, the Board approved final plans and specifications for waste pickle liquor disposal facilities to handle 120,000 gallons per month of waste pickle liquor from the Gary Tube Works and final plans and specifications for a scale pit for pretreatment of 5.25 mgd of wastewater from a new Seamless Tube Mill. The waste pickle liquor will be hauled to the Gary Sheet and Tin Mill for disposal in the deep well disposal system and the Seamless Tube Mill scale pit will discharge to the solids removal and oil skimming facilities for treatment of the total wastes from the Tube Works.

On August 15, 1967, the Board approved plans for solids removal and oil skimming facilities for treatment of 10,500 gpm of combined wastewater from the Gary Tube Works. All the facilities at the Tube Works will be completed by September 30, 1968.

Completion of the proposed facilities should provide adequate waste control. The corporation is maintaining an adequate effluent monitoring program.

Gary Steel Works, U. S. Steel Corporation, Gary

On August 15, 1967, the Board approved plans for treatment facilities to provide treatment of wastewater from the Gary Steel Works. The proposed facilities are as follows:

Coke and Coke Chemicals Plant

Pumps, sumps and piping will be installed to segregate and discharge contaminated wastes into the Gary Sanitary District's sewerage system in accordance with the approval of the Gary Sanitary District dated August 9, 1967. If the wastewater causes difficulty in the Gary Sanitary District's sewage treatment plant, the corporation will install the necessary treatment and control facilities. Either project will be completed by December 31, 1969.

Blast Furnace Area

The proposed facilities consist of clarifier scalpers ahead of the flue dust settling basin, a floating dredge to remove sludge from the settling basin, one-third increase in size of the flue dust settling basin, oil separation facilities at the Electric Power Station No. 1, and diversion of all secondary and tertiary precipitators and sludge blowdown from the Central Water Treatment Plant into the flue dust settling basins. The projects are to be completed by June 30, 1970.

Steel Making Area

The corporation will construct oil separation facilities for wastes from the Blowing Engine House No. 1 and Electric Power Station No. 1 and divert treated wastewater from the gas cleaning thickener to the flue dust settling basins. The projects to be completed by June 30, 1970.

Hot Strip Mills Area

The treatment works for the Hot Mills consist of sumps, pumps and piping to convey 96,275 gpm of wastewater from the West Mill sewer GW 12 and Central East Mill and West Mill sewers GW 10 and GW 11 to three settling and oil skimming basins. The project will be completed by June 30, 1970.

Completion of the facilities should provide adequate waste control. The corporation is maintaining an adequate effluent monitoring program.

Gary Sheet and Tin Mill, U. S. Steel Corporation, Gary

On August 15, 1967, the Board approved plans for waste treatment facilities for the Sheet and Tin Mill. The plan is as follows:

1. Acid rinse waters from the existing Sheet and Tin Mill 66-inch Continuous Pickling Line and the new 84-inch Continuous Pickling Line will be diverted to the existing 6-Stand Cold Reduction Mill waste treatment plant (Terminal Treatment Plant) by December 31, 1968.
2. Segregated wastewater from the Tin Mill will be discharged to the existing Terminal Treatment Plant by December 31, 1968.
3. Segregated wastewater from the Sheet Mill will be discharged to the expanded Terminal Treatment Plant by March 30, 1970.
4. Wastewater from the 80-inch Hot Strip Mill scale pits will be diverted to the expanded 84-inch Hot Strip Mill Filtering Plant by June 30, 1970.
5. Oily wastewater from the 80-inch 5-Stand Cold Reduction Mill treatment plant will be diverted

to the expanded Terminal Treatment Plant by June 30, 1968.

In order to handle the additional waste loadings listed in Items 3 and 5, additional primary solids and oil skimming, flocculation-clarification and oil solids handling facilities will be constructed at the Terminal Treatment Plant. Additional filtration facilities will be added to the 84-inch Hot Strip Mill waste treatment plant to handle the waste load listed in Item 4. The expansion of the Terminal Treatment Plant and the Hot Strip Mill waste treatment plant will be completed prior to June 30, 1970.

Completion of the proposed facilities should provide adequate waste control.

During August 1967, the corporation completed construction of the 6-Stand Cold Reduction Mill waste treatment plant (Terminal Treatment Plant), and it was in operation throughout the entire month of July; the 84-inch Hot Strip Mill waste treatment plant, and it too was in operation for the entire month of July; and the deep well disposal system, which was placed in operation on August 14, 1967. Acid neutralizing facilities for nitric acid and other small amounts of acid are expected to be placed in operation in September of 1967.

I might say that these acids that are being

P. E. Miller

discharged to the well formerly were discharged into a lagoon on hot slag at the Sheet and Tin Mill.

The corporation is maintaining an adequate effluent monitoring program.

American Bridge Division, U. S. Steel Corporation, Gary

Inspections by representatives of the Board show that adequate waste control is being provided.

Steiner Tissue Division, Georgia-Pacific Corporation, Gary

The corporation has reduced waste loadings to the Grand Calumet River by recirculation of waters and is installing a new vacuum save-all for recovery of fiber. A flow meter has been installed in the effluent pipe and flow and waste characteristics are being determined. The corporation continues to negotiate with the Gary Sanitary District regarding connection of wastewater to the District's sewerage system. The Board will require construction of waste treatment facilities by the corporation or connection to the Gary Sanitary District's sewerage system by December 31, 1968, and I might say here, if progress is not maintained, this corporation will be scheduled for a hearing before the Stream Pollution Control Board to insure that the facilities are completed by December

31, 1968.

Berry Refining Company, Gary

The refinery is being dismantled, at the present time.

Northern Indiana Public Service Company, Bailly Station, Baileytown

Results of the company's effluent monitoring program and inspection by representatives of the Board show that adequate waste control is being maintained.

Inland Steel Company, East Chicago

Final plans for the waste treatment facilities for the Plant No. 2 and No. 3 Coke Plant, and Plant No. 2 and No. 3 Blast Furnace Areas were approved on June 20, 1967. The plans for the terminal solids clarification and oil skimming facilities for treatment of wastes from nine Plant No. 2 sewers were approved on August 15, 1967. The facilities proposed are as follows:

Plant No. 2 and No. 3 Coke Plant Areas

The company will provide additional in-plant controls and permanent facilities to convey ammonia still wastes and other plant wastes to the East Chicago Sanitary District's sewerage system. The permanent facilities will be completed by October 1, 1967. The ammonia still wastes are currently being discharged to the East Chicago Sanitary District's sewerage system through temporary pumping facilities. Additional settling basins and recirculation pumps will be installed at the Coke Quenching Station. These facilities are to be completed during 1968.

Plant No. 2 and No. 3 Blast Furnace Areas

The company will provide additional in-plant controls and construction of secondary flue dust settling basins. The facilities are to be completed during 1968.

Terminal Treatment Plant

The plans require construction of primary and secondary solids removal facilities and oil skimming basins, solids handling facilities and oil dewatering and storage facilities for treatment of 140,000 gpm of wastewater from nine Plant No. 2 sewers. The facilities are to be completed in May 1970.

The company is in the process of letting bids for construction of waste treatment facilities for the new 12-inch Merchant Mill that were approved by the Board on March

21, 1967. The deep well disposal system approved by the Board on February 21, 1967, is under construction. The Merchant Mill waste treatment facilities will be completed by December 31, 1968, and the deep well system will be completed by June 30, 1968. Construction has been completed on the additions to the North End Lagoon that were approved by the Board on February 3, 1966.

The company has an adequate effluent monitoring program. Completion of the facilities proposed by the company should provide adequate waste control.

Universal Atlas Cement Division, U. S. Steel Corporation, Gary

The results of the corporation's effluent monitoring program and inspections by representatives of the Board show that adequate waste control is being maintained.

Northern Indiana Public Service Company, Mitchell Station, Gary

The results of the company's effluent monitoring program and inspections by representatives of the Board show that adequate waste control is being maintained.

Union Carbide Corporation, Chemicals Division, Whiting

The corporation has made substantial progress toward reduction of BOD, oils, and suspended solids to Lake

Michigan and has virtually eliminated the waste discharge to the Indiana Harbor Ship Canal. Among the changes are:

An oil skimmer on the power plant condensate return tank, a sludge concentration tank at the boiler water treatment plant, connection of product tank storage area drainage to the water reuse system, construction of storage tanks to store wastewater during periods of upset, piping, sumps, and pump to collect and convey floor drainage to the oil separation facilities, and Rapstan Filter to collect polyethylene pellets in the rail car and truck washing area.

Additional in-plant controls and sewer changes are currently under construction and will be completed before the end of 1967. The corporation is negotiating with the Hammond Sanitary District and the East Chicago Sanitary District regarding the discharge of 240,000 gpd of wastewater into the Hammond Sanitary District.

The corporation's latest effluent monitoring data show the following waste loadings: flow, 46.9 mgd; BOD, 3,138 lbs.; oils, 181 lbs.; and suspended solids, 922 lbs. When compared with the average waste loadings for the year 1966, the results show a 56 percent reduction in BOD, an 80 percent reduction in oil, and a 72 percent reduction in suspended solids.

P. E. Miller

I might say that in March we reported a 56 redution over previous information, and this is additional information that has been gotten since that time in the effluent at Union Carbide.

The corporation has installed a total carbon analyzer for automatic monitoring of wastewater and steps are being taken to equip the instrument for analyses of multiple waste streams. The project is to be completed by September 1967.

The facilities recently completed and under construction by the corporation should provide adequate waste control in respect to levels of BOD, oils, and suspended solids in the effluent. Additional studies must be made to determine if the facilities will provide adequate control relative to taste and odor-producing substances. The corporation will be required to control threshold odor-producing substances.

American Oil Company, Whiting

On July 1, 1967, the company completed construction of a sour water stripper on selective waste streams from catalytic cracking units. The sour water stripper was completed ahead of the December 1968, completion date outlined earlier. Analyses show that sulfides have been reduced by 99 percent, the ammonia-nitrogen reduced by 90 percent and substantial phenols removed.

Originally the design was for an 80 percent removal of sulfides and ammonia-nitrogen. The company is continuing work on separation of waste streams and improving operation of the stripper. Engineering studies continue in respect to in-plant control of contaminants. A review of the company's monitoring program shows that progress has been made towards elimination of periodic high concentrations of contaminants in the effluent. The company will be required to provide additional facilities to control the concentrations of BOD, oil and threshold odor-producing substances.

American Maize Products Company, Hammond

The company has completed removal of sludge from the aerated lagoon and waste stabilization pond and has installed additional aerators in the aerated lagoon section bringing the total aeration capacity to 250 hp. Plans are being formulated to increase the aeration capacity by 100 percent. Also completed was the diversion of several process drains to the lagoon system, and reuse of approximately 3.5 mgd of water. A double-effect evaporator is currently being installed in the syrup refinery. The company's program shows completion of all projects before December 31, 1968.

Commonwealth Edison Company of Indiana, Hammond

Inspections by representatives of the Board show that adequate waste control is being provided.

Little Calumet River-West

Simmons Company, Munster

The company has located the source of wastewater that has caused periodic high concentrations of chromium in the effluent and has diverted the wastewater to the chromium treatment facilities. The effluent monitoring data and inspections by representatives of the Board show that adequate waste control is being provided.

Grand Calumet River-West

Adolph Plating, Inc., Electrogalvanizing Division, East Chicago

Inspections by representatives of the Board show that concentrations of cyanide, zinc, and suspended solids in the effluent are excessive. The company has not established a routine effluent monitoring program. It will be recommended to the Board at its September 19, 1967, meeting, that an enforcement hearing be scheduled concerning pollution of the

Grand Calumet River caused by Adolph Plating, Inc.

LaSalle Steel Corporation, Hammond

The corporation's effluent monitoring program shows a reduction in suspended solids since March 1967. The latest effluent monitoring data show an average flow, 25,500 gpd; average suspended solids, 15.4 lbs.; and mean pH, 6.1. The corporation plans to install automatic bar descaling by the end of 1967 that will eliminate the acid pickling operation.

M & T Chemicals, Inc., East Chicago

The company and the East Chicago Sanitary District are negotiating an agreement for a sewer connection. The Board will require construction of waste treatment facilities by the company or connection to the East Chicago Sanitary District's sewerage system by December 31, 1968.

Here again, if this project is not moved, it will be recommended to the Board that it establish a hearing to determine whether or not the company is causing pollution.

Wolf Lake

Lever Brothers Company, Hammond

The company's effluent monitoring program and inspections by representatives of the Board show that the company is making progress toward reduction of BOD, oils, and suspended solids in the effluent to Wolf Lake. Engineering studies and evaluation of a cooling tower system for cooling and reuse of certain process waters is continuing. The Board will continue action under a stipulation agreed to during 1963, requiring satisfactory conditions in Wolf Lake Channel. The company is currently meeting the water quality standards established for Wolf Lake.

MR. STEIN: Thank you, Mr. Miller.

Are there any comments or questions?

MR. KLASSEN: Mr. Chairman, I would like to ask Mr. Miller to confirm something that I believe I mentioned before.

On Pages 6, 7 and 8, I believe, there are completion dates that differ from the conferees' dates up to June 30, 1970.

Have these dates been approved by the Federal Water Pollution Control Agency?

MR. MILLER: These were approved by Secretary Udall when he approved the water quality criteria and plans for implementation for the interstate waters.

MR. KLASSEN: Do you have an estimate, Mr. Miller, on the overall problem in that area, of what percentage -- maybe this can't be answered -- of the pollution has already been cleared up, or can't you make that kind of an answer?

MR. POOLE: I can't. Maybe Perry could.

MR. KLASSEN: How much of the problem has been taken care of?

MR. MILLER: Well, let me approach it a little bit differently.

I can't give you a figure on an estimate, but the major pollution problems in the area are in the area of the three steel mills. Inland, Youngstown and United States Steel comprise the three plants, and from this report, I think it is obvious that we are just beginning to get into the work in the big steel mills as far as removal of contaminants by the installation of treatment facilities.

We have been doing this on new installations as we go along, but here we are beginning now to pick up the older installations.

MR. POOLE: I remember one figure, Mr. Klassen, and maybe you do, from the original 1965 report, and it seems to me it was somewhere between 95 and 97 percent of the oil was coming from the steel mills.

You see, we are just starting to make a change in there. I don't know about the others, but that is one that sticks in my mind.

MR. KLASSEN: Yes.

MR. STEIN: Mr. Bacon.

MR. BACON: On Page 2 you make the statement that: "Tertiary treatment (7-day terminal lagoons) is now required of most new installations."

Is this the way you define tertiary treatment?

MR. MILLER: This is the way we would define one form of this.

Tertiary treatment may take different forms, but for these small subdivisions, we have usually complete or secondary treatment, plus chlorination, plus the seven-day lagoon.

MR. BACON: Could you express that in terms of the effluent quality on BOD and suspended solids, since you are talking semi-public? Is that possible, Mr. Miller?

MR. MILLER: I can't really do that for you.

MR. POOLE: We have had a few. I have asked them for more investigations on this, Mr. Bacon, and there have been a few of them that have been sampled, and they are doing better than 95 percent BOD. That is through the lagoons.

I should point out on the subdivisions as a matter of policy, where the lagoon comes in is if they are on a dry ditch, why, the lagoon is insisted upon.

MR. BACON: Mr. Poole, the reason I am asking this is because it will figure into our comments later on in the relationship of tertiary to the municipal wastes and to these criteria. I know this is not a difference of opinion, but a different definition of "tertiary."

I wondered if you had arrived at one that would apply to all wastes in terms of BOD or suspended solids?

MR. POOLE: We have not.

MR. MILLER: No.

MR. STEIN: We even run into different definitions of "secondary," Mr. Bacon.

Are there any further questions?

MR. POSTON: I would like to ask this:

In Youngstown Sheet and Tube Company, you indicate that further additional work is required to prepare final plans. Do you have any date when these works would be completed insofar as planning, and when you might complete the construction?

MR. MILLER: I gave the date for the completion of the construction facilities.

MR. POSTON: This is for Youngstown?

MR. MILLER: This is for Youngstown. Yes.

MR. POOLE: Go over them again.

MR. MILLER: That is to be completed construction by December 31, 1968; the blast furnace recirculation system by June 30, 1970; and the sewer work for collection of oils and additional work in the No. 1 tin mill, No. 2 tin mill, and the cold reduced sheet mill are to be completed by December 31, 1969.

These are completion dates for construction work. The final plans for the Buttweld mill were submitted by Youngstown in March of this year, and some of the others are spaced out.

I think there is work being done on these, and undoubtedly these will be submitted to us in the very near future.

MR. POSTON: Then to go back on Page 3, on Cities Service I note that the company will be required to provide additional reductions in BOD and threshold odor-producing substances.

Let me ask it this way: What kind of a schedule do you have for them on this work?

MR. MILLER: Well, this, I think, is going to depend on what actually is going to be involved in removing threshold odor substances. As yet we have not arrived at the need or what must be done in this area.

MR. POSTON: Does this then apply to Mobil?

MR. MILLER: This would apply to American, Mobil, Sinclair, Cities Service and Union Carbide.

MR. POSTON: As I analyze this then, Cities Service, Mobil, Sinclair and American Oil, U. S. Steel, Inland Steel and Youngstown, will not meet the schedule of December 31, 1968, for completion of construction?

MR. MILLER: I would say hopefully on all of them they would meet it, with the exception of Youngstown, Inland and U. S. Steel, and even Sinclair, as I recall, is scheduled ahead of this, so that hopefully these would be done.

The threshold odor is an area where I think we are going to have to tie down what the problem really is before we can come up with the treatment process, so this one is a little undecided.

MR. POSTON: Well, I think you have given us a good summary of your progress. We can visualize what parts you are able to meet and what areas you cannot meet from this report.

MR. STEIN: Mr. Bacon?

MR. BACON: I think we are at a rather fundamental question here now about these completion dates, and, of course, it applies to one of our dischargers as to whether it is going to be December 31, 1968, or, as I understand, Mr. Poole's adopted standards and criteria specify June 30, 1970. There is a year and a half difference here.

MR. POSTON: I think that's all.

MR. STEIN: I think that that is a fair statement or a fair question.

MR. BACON: Well, I mean, I think it is going to be fundamental to our relationship here of the various regulators to the dischargers and it is up to the conferees to have a degree of uniformity among the States.

MR. STEIN: That is very true.

MR. KLASSEN: I think Mr. Bacon raised a fundamental question here as to where the conference stands and its status, which came into being before the present Federal jurisdiction came into being, and I sort of sense that we may be now in an entirely different status.

Are we on a lower level than we were? Are we a rubber stamp for the Federal Water Pollution Agency?

These, I think, are some fundamental questions, whether we have a place here any more, or whether the Federal Water Pollution Agency is taking over. I think these are some fundamental things, although Mr. Bacon hasn't quite expressed it this way, but this is what I kind of sense.

I mean, whose rules are the industries going to follow now?

MR. BACON: Well, can't we view the conference proceedings, as important as they have been and will continue to be, a prior proceeding or one that predated the Federal Standards Act, you might call it, and I would envision in the long run that the Federal law was to take over if it really superseded the conference proceedings.

In fact, we have had lots of discussions among all of us, I am sure, as to where the conference fits into the Federal process, and it shouldn't really make any difference here to the deliberations of this body that this is a conference.

I am more concerned about getting the uniformity rather than who has jurisdiction at the present time, or if one is transcending the other. I just believe that whatever we are going to follow, we should pretty much put across the board, because although we are basically concerned in the Sanitary District as long as we can maintain the positive flow away from the lake, or, conversely, enough toward the lake, we are interested in really one discharge as far as the lake is concerned, but still we want to be consistent with our fellow conferees.

Furthermore, what we do with that discharge applies to all of those along the Calumet, because you have got to be consistent among the dischargers.

MR. POOLE: We debated this situation in executive session, if you will recall it, in the March conference.

Now, it has been the position of the State of Indiana from the beginning of the conference in 1965 that we want to get this job done as quickly as it is feasible to get it done.

As you know, however, I, as the Indiana conferee, have had misgivings about the practicability of the December 1968 date on some of the Indiana installations for some time now. That had been expressed earlier even than at the March conference, when I expressed it again then.

I urged the conferees at the March conference to consider a different set of dates, reminding them that before this September conference the State of Indiana would have had to have adopted criteria and held hearings for these very waters to meet our requirements under the 1965 law.

Short of getting any agreement at the close of our March conference, I guess that you might say that the State of Indiana took the bull by the horns and put in its report for the hearings this June 30, 1970, date. That was exposed to public hearing in Gary, and subsequently to a second public hearing in Indianapolis.

I can assure you that if I and my staff thought that all of this work could have been done by June 30, 1969, we would have put down June 30, 1969, instead of June 30, 1970.

I, as an engineer, know something of the magnitude of the work. I just don't believe that it can be done short of shutting the steel mills down and doing nothing else, by

December of 1968.

This, I guess, is an excuse, if you will, or an explanation for the proposal we have advanced. I think it is realistic.

I have been a party to the Lake Erie Conference, which none of the rest of you except Mr. Stein and Mr. Poston have. As I recall it, the Lake Erie dates go into June 1971, and I believe there is one mill in Buffalo that is in 1972.

The very same thing was debated, as Mr. Stein knows, in the Lake Erie Conference.

MR. BACON: Is there any doubt in your mind that these large mills of yours can meet that June 30, 1970, date? Is this a practical date?

MR. POOLE: I think it is a practical date, but a tight one, and as far as doubt in my mind, I would say with the delivery of equipment and that sort of thing, that is going to determine it. I still think it is a pretty tight schedule for some of the work.

MR. POSTON: Is there any estimate of the amount or the percentage of construction that has been initiated compared to the total that must be done? Have you any way to evaluate how much pressures have been exerted to getting this job done so far?

MR. MILLER: I don't have any percentage figures. I would say to you that there is anywhere from three to four projects that were completed in each one of those mills last year, and there may be more than this.

There are many that we know are currently under construction, and then we have had a number of final plans that came in by June of this year that were approved in June, July and August, which will carry on for some time to come.

I don't have an actual percentage figure, but there is work under construction, work that has been completed, and more work planned and in progress.

MR. POOLE: My personal feeling, for whatever it may be worth, is that with the exception of the three small ones which Mr. Miller mentioned -- that is, Adolph Plating Company, which I intend to recommend for formal enforcement hearing in our Board, the Steiner Tissue and M & T Chemical Company, that Indiana industry is operating in good faith now and about as expeditiously as they can.

Maybe they have pulled the wool over my eyes.

MR. STEIN: Well, I don't know. It seems to me that obviously we have a very fundamental question here.

As to the supremacy of one Federal Act or one section over the other, I don't think we can say that. Both are co-equal. Perhaps it is the one that comes later.

P. E. Miller

Obviously, both have an effect on the other, and you can take either avenue. In other words, the States have either avenue, or the Federal people have either avenue.

I don't know that we disagree on this, Mr. Klassen. As far as I can see I don't consider a standard, as the Congress wrote it, a unilateral action, so to speak. As far as I can see, what was done with these Indiana dates -- whatever you may think of the dates -- was done with the full concurrence of the State of Indiana.

In other words, there was no difference between Indiana and the Federal Government. This was not a unilateral State action. This was an action of the Federal Government endorsing a State plan as the State plan was put in.

If there is any difference between the Indiana and the Federal officials on that standard operation and your implementing schedule, I know of none, but if there is we will get to it, or we should hear about it. There is not, as far as I know.

The next point we should get at, and I think this is a fundamental thing if we are dealing with pollution control, is how can we move pollution control forward as rapidly as we can and as reasonably.

If I understand your statement, we have a 1968 date or the beginning of 1969. Mr. Poole says a year and a half is a tight schedule. Obviously, on the facts, if Mr. Poole is correct that a year and a half more is a tight schedule, then the 1968 date seems out of the question and unrealistic and should be viewed again.

Now, certainly, the Sanitary District of Illinois has not committed themselves and should make their views clear, but if this is the case, I think we should proceed on the basis of the facts to get the thing cleaned up rather than get ourselves involved in the jurisdictional issue.

What we are all interested in is getting pollution control and getting these things as rapidly as possible.

I would like to just say one thing more. I think Mr. Miller's presentation is the kind of presentation that, at least, gives all the other jurisdictions -- that is, the other States, the District, the Federal Government, the people and the press -- a pretty good idea in enough detail with specificity as to what is going on and if they are meeting the schedule or not.

The question we have to raise is this: While we are proceeding with this problem, we have heard a report of the Federal monitoring people and of Mr. Vaughn of the Chicago Water Works that the waters were not getting any better. If anything, they were getting worse. The question is, why is this so?

I would like your comments on this, Mr. Miller. The point is the three big forces of waste discharge, at least within Indiana, are just moving ahead on schedule with the program. And as yet the effects of their remedial program have not been felt. And since the effects of this program are not felt and won't be felt for a year or two years, or so forth, we will not get the results, nor can we expect to get the results in the receiving waters until these programs are in effect.

Is this substantially correct?

MR. MILLER: I think this is right. I think we have seen some projects go in this year, like the coke plant at Youngstown and the one that is temporary that will be made permanent at Inland, that have gone in recently, and the dripper at American, which went into operation in July and is doing very well on ammonia, and also reducing phenols, and I would be hopeful at least that in these areas we would see some reduction as we go along.

Up to now we have not had these reductions in the big contributors, and we don't see much.

MR. STEIN: This seems to dovetail.

Let me ask you another question: As I listened to the reports of Mr. Vaughn and the Federal report of the monitoring, the kinds of wastes they were complaining about were not the bacteriological complaints usually associated with municipal wastes. They were complaints about substances or materials usually associated with industrial wastes.

Is this a fair statement?

MR. MILLER: This is a fair statement.

MR. POSTON: Well, I --

MR. STEIN: Pardon me.

I think you know that the problem we have faced here is a beach problem, and so forth. If we have reversed the trend or, at least, stopped the trend from getting worse from bacterial pollution, I think we have made the first step in the order of priority and are moving ahead.

If we are dealing with industrial wastes, and your report of progress and what you are moving on seems to be zeroing in on these places, it would seem then that we might expect to find commensurate improvement in water quality.

MR. MILLER: I think this must be so.

MR. STEIN: All right. This is the picture that I think we have to put together here, as I see it.

If any of you people have some other views on this, we would like to have them, but, as far as I can see, the statements here are pretty much consistent from departments which are running independently—from the Water Department which is running tests at the water intake, the Federal people going out and measuring the stream, and Mr. Miller working with the industries. These independent reports that have come in seem to present a picture that dovetails one with the other.

This, I think, is just part of the growing pains of progress when you are in the midst of a clean-up program. I think there might be agreement on that.

However, I do think this question of the dates and the impact of the standards will be something that the conferees will have to check into.

MR. BACON: I do think that this is so fundamental and it touches so many people's pocketbooks and so many people that use the water, that it deserves a public discussion now, or whenever it is held, publicly rather than retiring.

MR. STEIN: I can understand that. Mr. Bacon, I have never, unless the conferees wished, wanted a --

MR. BACON: I am simply saying now or sometime before this adjourns, because this is a fundamental question, as I said originally.

MR. STEIN: I understand your view.

We have gone into this both ways, Mr. Bacon. We have had executive sessions or we have done this in public.

I think we would like an expression from the conferees as to how they would like their discussion.

Are there any further questions of Mr. Miller?

(No response.)

MR. STEIN: If not, may I suggest that before we go to Illinois for their presentation -- did you have something?

MR. POSTON: Just so that we don't get the illusion that we have solved all the bacteriological problems, I think it should be very clear that the beaches at Hammond are not open to the public, and that we still have a problem there.

While I am not sure where this total problem comes from, it appears to me that it is probably a stormwater overflow problem, but we certainly have this problem with us yet.

MR. STEIN: Yes.

Again, this may be the crux of the question of treatment, precisely.

I hope no one has that illusion. What I said is, we stopped the increase. That is all. That does not mean you have solved the problem. As you know, meeting here summer after summer, we were in a position in which it was nip and tuck whether to recommend the closing of additional beaches here as we did in New York this year.

There were many, many extra beaches declared polluted and unsafe for swimming in the New York area, and that involved Coney Island, Staten Island, and so forth, this year. This has not happened in Chicago, and this is something to remember.

In view of the point that Mr. Bacon raised, I suggest we take a ten-minute recess. Possibly during that time you will have a chance to think over how you want to call the signals as to whether you want to take up this question and if you wish to hold a public or executive session.

We will stand recessed for ten minutes.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

Sometimes the best thing we do is call a recess. Maybe we should have them longer and more frequently. I always felt that way in high school.

Maybe we have something in the record on the acceptance of the standards which can provide a basis for an accommodation.

I wonder, Mr. Poston, if you would read the pertinent point from the Indiana standards that was adopted by the Secretary.

MR. POSTON: These are the criteria of the State of Indiana adopted for the waters, including the State of Indiana and including the Calumet area.

P. E. Miller

I was a little bit chagrined to hear that the Secretary had approved something that was possibly superseding a little power of this conference, but in this document which was approved by the Secretary, I would like to read a statement.

Item 2 concerned the four oil refineries, and I will read it.

> "The Cities Service Oil Company, Mobil Oil Company, Sinclair Refining Company, American Oil Company, in addition to Union Carbide Chemical Corporation, will have to provide time-tables for construction of additional waste treatment facilities to control BOD, oil and threshold odor substances, which are consistent with the requirements of the conference on pollution of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan and tributaries"

and this is this conference.

> "The conclusions and recommendations of the conferees established December 1968 as the latest date for completion of water pollution abatement facilities by industry except for a few industries where variation is justified and approved by the Board and the conferees."

This means to me that until other dates are approved by the conferees, this is a condition which the Secretary at the time knew of when he signed approval of the standards.

MR. POOLE: Read the next one, though.

MR. POSTON: Do you want me to read that?

MR. POOLE: Read No. 3.

MR. STEIN: Read No. 3.

MR. KLASSEN: Before we go to No. 3, Mr. Stein --

MR. STEIN: Yes.

MR. KLASSEN: -- there is one point here, Mr. Poston. That is not quite the same language.

I don't want to be in the category of the man who was picking flyspecks out of the pepper, but it said here that "except for a few industries where variation is justified," and the conferees said "where variation may be justified," which puts a little different connotation on it.

MR. POSTON: Well, I was reading it out of the document that was submitted to the Secretary by the State of Indiana.

MR. KLASSEN: Yes, but the conferees used different wording.

MR. POSTON: Yes.

MR. STEIN: But No. 3 makes a flat statement.

MR. POSTON: Do you want me to read the next item, No. 3?

MR. STEIN: Yes.

MR. POSTON: "The four steel plants, Inland Steel Company, Youngstown Sheet and Tube Company, United States Steel Corporation Gary Steel Works and the Gary Sheet and Tin Mill will have progressive waste treatment construction programs, with the latest completion date being June 30, 1970. The fifth steel plant, Gary Tube Works of United States Steel, will complete facilities in 1968."

MR. STEIN: I think Mr. Bacon's point is still pertinent. I don't think the oil refineries are presenting us really with a problem, are they?

When you have to consider a variation, the conferees will always consider it, but I think that No. 3 is a pretty flat statement, and unless someone else has a different reading to it, it seems that they differ in numbering, that that last sentence in No. 2 refers to the precedent references to the four oil refineries, and the steel mills stand by themselves.

Now, did you mean that any differently? Did you mean that last sentence to imply the three?

MR. POOLE: No. I think we meant from the beginning, as I indicated here before the recess, that in our judgment the steel mills meet the June 30, 1970, date.

MR. STEIN: I think that is a fair reading of this, Mr. Poston, unless someone else has a contrary reading.

MR. POOLE: Obviously, we are trying to get something resolved here.

The Metropolitan Sanitary District has some problems from industries, and I think what the Metropolitan Sanitary District is proposing or what they consider realistic is one of the important considerations here in resolving this issue.

There was wording, as Mr. Klassen read, from the beginning in the conclusions of the conferees going back to the very first conclusions where we had this 1968 date, that there would be opportunity or would be consideration of other dates. I don't remember exactly how it is worded, but that was the intent of the wording.

MR. STEIN: That is right.

MR. POOLE: It would seem to me that we are now confronted here with --

MR. STEIN: I would suggest, in order to move ahead with this, that we get the Illinois report and the Metropolitan Sanitary District report, because we can stay on this issue all day, and then we will have all the facts before us, and then we can resolve the issue.

Mr. Klassen, would you proceed with the Illinois report?

MR. KLASSEN: Yes.

STATEMENT OF CLARENCE W. KLASSEN, CONFEREE AND TECHNICAL SECRETARY, ILLINOIS SANITARY WATER BOARD, SPRINGFIELD, ILLINOIS

MR. KLASSEN: Mr. Chairman, Conferees and Ladies and Gentlemen:

I will summarize the report I have, but I would ask that the entire report be included in the record.

MR. STEIN: Without objection it will appear in the record as if read.

MR. KLASSEN: The Conference called by the Federal Water Pollution Control Administration March 2-9, 1965, resulted in agreement to obtain secondary treatment of all sewage and adequate effluent disinfection by April 15, 1966, and immediate action to assure optimum operation of industry waste control facilities.

The maximum time schedules for control of waste discharges from industry provide for final engineering plan documents by June 1967, with construction completion and facility operation by December 1968.

Most of Cook County is encompassed by the Metropolitan Sanitary District of Greater Chicago. This Sanitary

District is exempted from the jurisdiction of the Sanitary Water Board by Section 16 of the Act. The last General Assembly amended Section 16 by specifying that the Sanitary Water Board adopt and enforce water quality standards within any sanitary district with a population of 1,000,000 or more. This was contained in HB 1177 sponsored by the Water Pollution and Water Resources Commission, chaired by Representative Carl L. Klein. This bill passed the Legislature June 12 and became effective June 23, 1967, when signed by Governor Kerner. The Sanitary Water Board held a public hearing on water quality standards for streams within MSD on June 20, and the standards were officially adopted by the Board June 28, 1967. Those standards involving interstate waters were immediately submitted to the U. S. Department of the Interior in order to meet the June 30, 1967, deadline contained in the Federal Water Quality Act of 1965. These interstate water quality standards for the Calumet region are identical with the criteria adopted by the conferees. The Calumet inner harbor area and the Calumet River were included in the Chicago area standards since the area involved is entirely within MSD territory. All industry will be required to provide adequate treatment by the end of 1968, in accord with the schedule approved by the conferees of this conference. It is expected that MSD will submit a full progress report today. An area in the SE portion of Cook County operates independent of the MSD and is under the jurisdiction of the Sanitary Water Board. This area includes the following municipalites: Bloom Township Sanitary District, which serves Chicago Heights, Park Forest and South Chicago Heights; Crete; Flossmoor; Homewood; Lansing; Olympia Fields, Richton Park, Steger; and Thornton.

The industries in the area are mostly in or adjacent to Chicago Heights and are tributary to the Bloom Township Sanitary District sewage treatment works. A number of these industries have cooling water discharge to the City of Chicago Heights storm sewer which discharges via State Street Ditch to Thorn Creek. Under Sanitary Water Board Order of December 1, 1966, the city and industry are working to abate contaminants which have been discharged with this cooling water. The city is submitting periodic reports to the Sanitary Water Board on action being taken. While slow, progress is being made.

All municipalities have had secondary treatment of sewage for many years. Some of these facilities receive flows at design capacity and overload flows at peaks and during storm flow. Although much of the sewer systems are designed to carry sewage only, there being separate storm systems, excess amounts of ground water infiltration and surface water ingress creates hydraulic problems.

C. W. Klassen

All communities have been required by the Sanitary Water Board to provide additional treatment facilities where needed and auxiliary or third stage facilities to control or abate pollution from bypassed peak or storm flows. Such facilities have been completed by five communities, are under design or preliminary engineering by four communities and are under construction at Bloom Township Sanitary District.

The Federal Water Pollution Control Administration conference on pollution of lower Lake Michigan and the Calumet Area was held in Chicago March 2-9, 1965. The conferees representing the State water pollution control agencies of Indiana and Illinois, the Metropolitan Sanitary District of Greater Chicago and the U. S. Department of the Interior agreed to take immediate action to obtain secondary treatment of all sewage plus effluent disinfection by April of 1966. In the Sanitary Water Board area of Cook County this was accomplished during 1966 with one exception, however, three other communities missed the target date by 2 to 5 months. Installation of temporary chlorination facilities at seven locations was necessary, since location and construction of permanent facilities had to be correlated with plant expansions or other necessary improvements. All but one community has chlorination equipment in operation, and that one now has the equipment on hand.

Operation deficiencies continue to be an important factor in the control and prevention of stream pollution. Effort will continue toward minimizing this problem. This area has been plagued with high intensity rains, floods, tornadoes, blizzards, and power outage during the last two years. Under such adverisities some pollution cannot be prevented. Credit must be given to those who had to face and adjust to these problems.

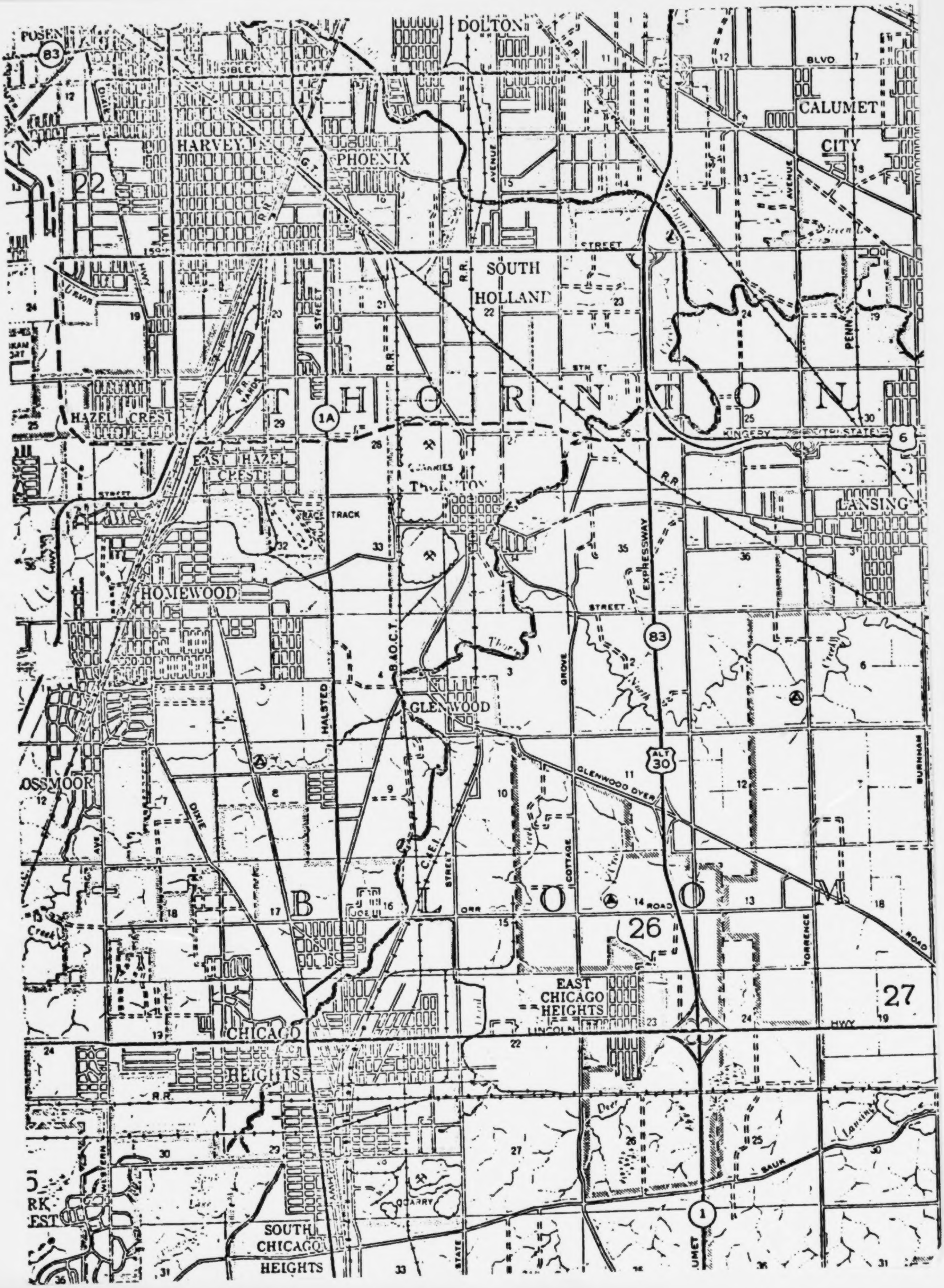
This report includes a table summarizing the results of stream water quality analyses for Thorn Creek and portions of the Little Calumet River through 1966 and for 1967. Key parameters under the stream water quality criteria where improvement is still needed is reflected in these summaries. Periodic low dissolved oxygen levels have an adverse effect on fish life. Continued high levels of dissolved solids, chlorides, sulfates and phosphates reflect the industrial activity of the area.

The presence of detergents appears to be decreasing and may reflect the formula change in cleaning compounds and also better industry control and use of surfactants. The average and maximum biochemical oxygen demand remains above normal for streams but is not at excessive level. The coliform and enterococcus bacteria counts are excessive and have an adverse effect on the full recreational use of the streams.

Full effect of effluent disinfection had not been obtained during the sampling periods reported. Also the Little Calumet River results reflect some flow from Indiana. Maximum benefit of improvement and pollution control activities will not be reflected by stream sample tests until the Homewood and Bloom Township sewage works expansion and improvements are completed in 1969.

The Sanitary Water Board, the industries and the municipalities are conducting a program of waste treatment control, facility improvement and operation efficiency within the limits of present technology to obtain maximum stream improvement benefits.

Submitted by C. W. Klassen, Technical Secretary, Illinois Sanitary Water Board.


POSEN
83
DOLTON
SIBLEY
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SOUTH HOLLAND
T H O R N T O N
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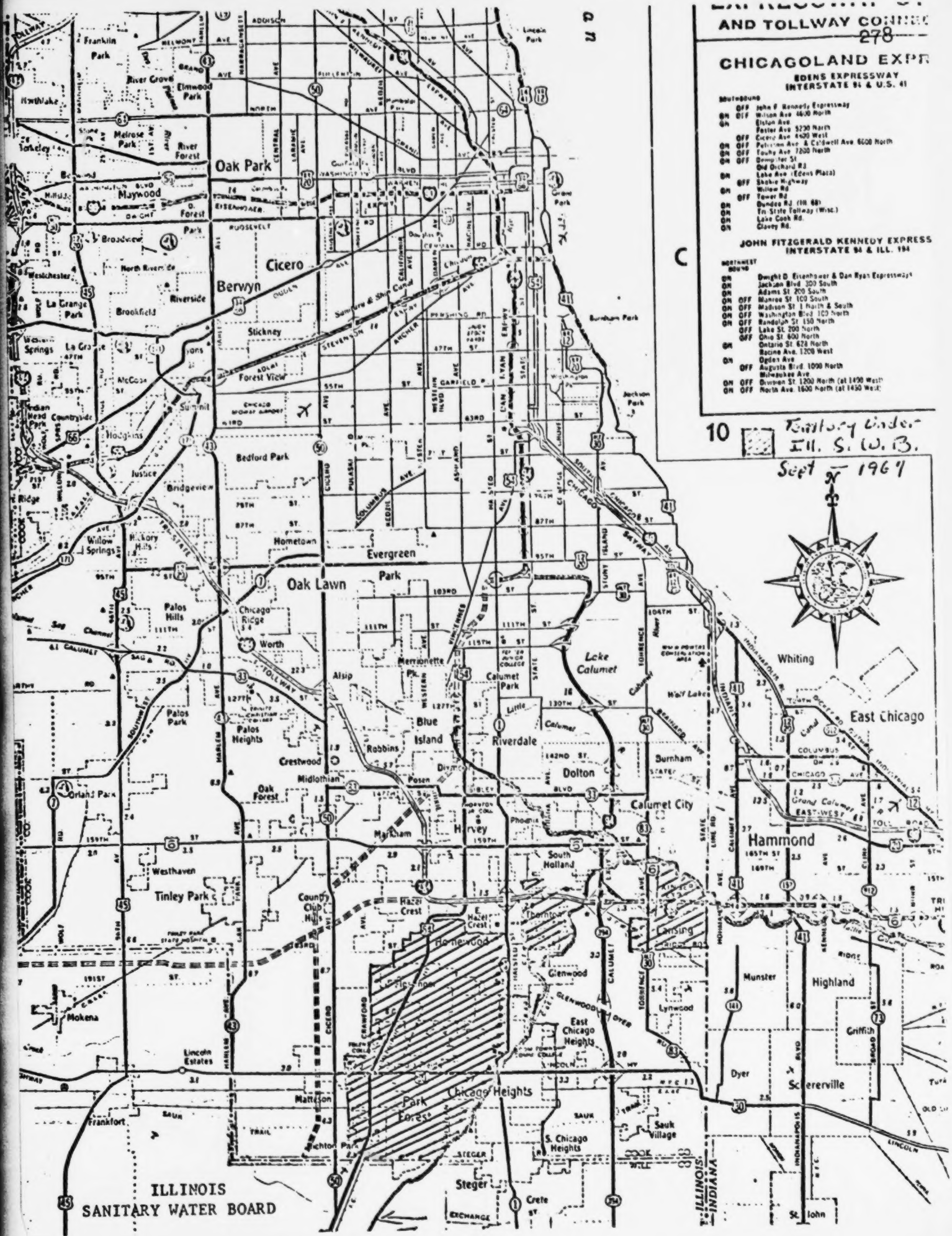
HAZEL CREST
EAST HAZEL CREST
KINGERY
TRI-STATE
6
QUARRIES
THORNTON
LANSING
RACE TRACK
HOMEWOOD
EXPRESSWAY
83
GLENWOOD
HALSTED
GROVE
ALT 30
GLENWOOD DYER
FLOSSMOOR
DIXIE
COTTAGE
TORRENCE
BURNHAM
B L O O M
26
27
EAST CHICAGO HEIGHTS
LINCOLN
HWY
CHICAGO HEIGHTS
QUARRY
SAUK
1
SOUTH CHICAGO HEIGHTS
PARK FOREST

278



AND TOLLWAY CONN

CHICAGOLAND EXPR

EDENS EXPRESSWAY
INTERSTATE 94 & U.S. 41

SOUTHBOUND		
	OFF	John F. Kennedy Expressway
ON	OFF	Wilson Ave 4600 North
ON		Elston Ave
		Foster Ave 5230 North
	OFF	Cicero Ave 4420 West
ON	OFF	Peterson Ave & Caldwell Ave 6600 North
ON	OFF	Touhy Ave 7200 North
ON	OFF	Dempster St
		Old Orchard Rd
ON		Lake Ave (Edens Plaza)
	OFF	Skokie Highway
ON		Willow Rd
	OFF	Tower Rd
ON		Dundee Rd (Ill. 68)
ON		Tri State Tollway (Wisc.)
ON		Lake Cook Rd.
ON		Clavey Rd.

JOHN FITZGERALD KENNEDY EXPRESS
INTERSTATE 94 & ILL. 194

NORTHWEST BOUND		
ON		Dwight D. Eisenhower & Dan Ryan Expressways
ON		Jackson Blvd 300 South
ON		Adams St 200 South
ON	OFF	Monroe St 100 South
ON	OFF	Madison St 1 North & South
ON	OFF	Washington Blvd 100 North
ON	OFF	Randolph St 150 North
	OFF	Lake St. 200 North
	OFF	Ohio St. 600 North
ON		Ontario St. 628 North
		Racine Ave. 1200 West
ON		Ogden Ave
	OFF	Augusta Blvd. 1000 North
		Milwaukee Ave
ON	OFF	Division St. 1200 North (at 1450 West)
ON	OFF	North Ave. 1600 North (at 1450 West)

10 ▨ Territory Under Ill. S. W. B.

Sept - 1967

TABLE I

Municipality	Type	Stream	Secondary	Chlorination		or Engineers	Tertiary	Design	Connected	Effluent
			Since	Temp.	Perm.	Retained	Treatment	Pop.	Pop.	Equivalent
Lansing	Ft	Little Calumet	1959	9/17/66		June '65	Under Design	25,000	18,500	2,760
Thornton	Ft	Thorn Creek	1959	4/7/66			Designed	4,500	2,890	434
Bloom Twp. San. Dist.	Aa	Thorn Creek	1957	8/10/66			Under Construction	60,000	75,000	15,000
Flossmoor	Ft	Butterfield Cr.	1956	3/31/66	9/66		Completed	8,000	4,800	720
Homewood	Ft	Butterfield Cr.	1956	3/31/66		Oct.'65	Expansion Planned	16,000	15,000	2,250
Matteson	Ft	Butterfield Cr.	1959	8/1/65	Annexed to MSD Chgo.July '65			5,000	3,300	494
Olympia Fields Graymoor	Fs	Butterfield Cr.	1954	5/1/65	9/1/65		Studied	400	260	26
Olympia Fields Main	Ft	Butterfield Cr.	1956	3/31/66		June '65	Studied	2,500	1,400	210
Olympia Fields Woods	Fs	Butterfield Cr.	1959	3/31/66		June '65	Studied	1,500	400	40
Richton Park	Aa	Butterfield Cr.	1964		On hand	Sept. '65	Completed	3,000	1,050	165
Crete	Ft	Deer Cr.	1956	4/8/66	9/66		Completed	4,000	3,790	565
Wood Hill Subdivision	Ac	Deer Cr.	1962		1962		Completed	2,500	1,000	100
Lincolnshire Country Club	Ad	Deer Cr.	1962	4/1/66		Sept.'65		110	40	6
Green Briar Subdivision	Ad	Deer Cr.	1965		11/66	Nov.'65	Completed	120	New	
Steger	Aa	Third Creek	1957	4/6/66	10/66	June'65	Completed	10,000	6,430	950

MEMORANDUM

September 8, 1967

SUBJECT: CALUMET AREA - LAKE MICHIGAN
STATUS REPORT
ILLINOIS-INDIANA INTERSTATE POLLUTION

TO: C. W. Klassen, Technical Secretary
Illinois Sanitary Water Board

The following is a summary of the activity of the communities and industries in the Calumet Area to comply with the recommendations of the conferees of the 1965 enforcement conference. This area in south Cook County is under Sanitary Water Board jurisdiction.

All municipal sewage treatment works provide secondary treatment. Six of the twelve plants have additional facilities (polishing ponds) in operation to provide supplemental treatment of the effluent and partial treatment of the bypass flows. All twelve have chlorination facilities installed.

SUMMARY BY COMMUNITY

SANITARY DISTRICT OF BLOOM TOWNSHIP

Temporary chlorination facilities in operation utilizing the troughs of the final tanks for contact. Construction started during the first week of August 1967 on plant expansion project, which includes permanent chlorination facilities. Anticipated construction time is 18 to 24 months. The superintendent of the District has had numerous conferences with representatives of the industries, encouraging them to connect to the Sanitary District sanitary sewer system, after proper pre-treatment.

CRETE - Village

Permanent chlorination and polishing pond in operation since September 1966. Operation and maintenance is satisfactory. All bypass flow receives at least chlorination and primary treatment in lagoon.

CRETE - Greenbriar Subdivision

Plant includes activated sludge, polishing pond and chlorination. Operation and maintenance is satisfactory. All bypass flows receive chlorination and primary treatment in lagoon.

FLOSSMOOR

Permanent chlorination and polishing pond in operation since July 1966. All bypass flows receive chlorination and primary treatment in lagoon. Village has retained engineers to study treatment facilities for an expansion and improvement project. Operation and maintenance is satisfactory.

HOMEWOOD

Temporary chlorination facilities using final tanks for contact, in operation since March 31, 1966. Engineers have submitted report on inadequacies of sewer system and sewage treatment facilities and have been retained to prepare final plans and specifications for sewage treatment plant expansion and improvement project. Operation and maintenance of existing sewage treatment facilities is satisfactory.

The Sanitary Water Board has refused to issue permits for sanitary sewer extensions tributary to existing Homewood facilities pending specific assurance that capacity will be expanded. This has resulted in a court suit by a developer for a mandamus directing the Board to issue a permit for this project.

LANSING

Temporary chlorination facilities using final tanks for contact in operation since September 17, 1966. Village obtaining site for permanent chlorine contact tank and polishing pond. Operation and maintenance remains excellent.

LINCOLNSHIRE COUNTRY CLUB

Interim chlorination still in operation.

OLYMPIA FIELDS

Temporary facilities in operation at all three plants since March 31, 1966. Sanitary Water Board permit issued for improvements, including effluent pump station and polishing pond, at the Woods plant and plans to convert the Graymoor sewage treatment facilities to a pump station and abandon this plant. Operation and maintenance at the three plants is satisfactory.

RICHTON PARK

Chlorination facilities not yet operational. Existing facilities, including lagoon for polishing and treatment of bypass flows, well maintained and operating satisfactorily.

STEGER

Permanent chlorination facilities, and polishing pond in operation since October 1966. All bypass flows receive chlorination and primary treatment in lagoon. Operation and maintenance satisfactory.

THORNTON

Temporary chlorination facilities using final tank for contact in operation since April 7, 1966. Construction has not yet started on the polishing pond. The Village has retained new operator, August 1, 1967, to improve operation and maintenance of plant.

WOODHILL UTILITY COMPANY

Permanent chlorination facilities installed with original project. Effluent polishing pond in operation. Operation and maintenance is satisfactory.

****

INDUSTRIES WITH DIRECT DISCHARGE

INTERNATIONAL MINERAL AND CHEMICAL CORP.

Pre-treatment facilities in operation since July 18, 1967, now discharge all flow to sanitary sewer system and the sewage treatment facilities operated by the Sanitary District of Bloom Township.

CERTAIN TEED PRODUCTS

Engineering Department developing plans for closed system for industrial wastes. Sanitary wastes discharge to City sanitary sewer system.

CHICAGO HEIGHTS - State Street Ditch

Sanitary Water Board Order (December 1, 1966) requires that discharge of industrial wastes to Third Creek (State Street Ditch) be discontinued before June 1, 1968. The city is submitting periodic reports to the Sanitary Water Board on action being taken by the City of Chicago Heights to locate and to eliminate sources of industrial waste discharged to the storm sewer system.

PREPARED BY /s/ Carl T. Blomgren
Carl T. Blomgren, Sanitary Engineer

REVIEWED BY /s/ Benn J. Leland
Benn J. Leland
Engineer-in-Charge of Chicago Office

Summary of Chemical and Bacteriological Data

Station HB 02 Little Calumet River Wentworth A.Bridge

Maximum limits under Water Quality Criteria for Little Calumet River Shown on Next Line.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
	90°	2-4									6.5 - 9.0	0.5	10.0	5,000	500
Thru 1965															
Max.	90	17.3	115	1,381	75		330	620		0.4	8.3	25.0	29	2,400,000	18,000
Min.	32	0.0	5	481	20		104	196		0.1	7.1	0.0	4	3,000	
Ave.	56	6.0	25	950	45		228	418		0.2	7.7	1.8	11	309,285	2,840
Med.	60	4.0	000	950	40		200	400		0.0	7.6	0.6	8	100,000	1,000
1966															
Max.	80	14.4	270	1,429	88	250	332	528	10		8.4	0.9	37	2,300,000	18,000
Min.	36	0.2	11	392	16	250	92	160	1		7.4	0.0	3	7,000	200
Ave.	55	4.7	62	827	44	250	196	343	5		7.7	0.2	11	484,090	3,569
Med.	50	4.0	20	650	40	150	150	300	4		7.6	0.0	8	100,000	1,000

Station HB 03 Little Calumet River Torrence Ave.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
Thru 1965															
Max.	75	19.9	46	1,098	77		272	468			8.7	1.5	26	11,000,000	21,000
Min.	47	1.8	6	505	25		112	192			7.4	0.2	4	12,000	10
Ave.	65	6.7	15	955	59		218	375			7.9	0.7	10	1,719,222	2,720
Med.	60	2.5	000	950	60		200	400			7.6	0.8	8	100,000	100
1966															
Max.	79	13.4	180	1,213	117	150	276	424	21		7.8	1.3	21	1,000,000	11,000
Min.	33	0.4	10	463	24	150	88	204	3		7.4	0.0	2	2,600	70
Ave.	53	4.9	50	832	57	150	188	333	9		7.6	0.3	8	409,327	3,259
Med.	50	2.5	20	800	60	150	150	300	8		7.6	0.2	8	100,000	1,000

Summary of Chemical and Bacteriological Data

Station HB-04 159th St. Little Calumet River Below Thorn Cr.

Maximum limits under Water Quality Criteria for Little Calumet River Shown on Next Line.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
90°		2-4									6.5-9.0	0.5	10.0	5,000	500
Thru 1965															
Max.	76	14.0	380	1195	243		272	576		2.9	8.1	1.5	17	500,000	7,000
Min.	48	0.8	5	485	65		140	292		2.9	7.2	0.3	3	4,000	60
Ave.	65	5.4	53	957	183		232	498		2.9	7.7	0.8	7	175,375	1,376
Med.	60	2.5	-	700	120		250	500		2.8	7.6	0.6	6	100,000	100
1966															
Max.	76	8.4	290	1390	335	200	420	592	12	35	7.4	.8	41	10,000,000	21,000
Min.	38	0.6	8	395	40	200	132	244	2	3	7.5	.0	2	8,000	100
Ave.	55	3.7	59	817	159	200	226	439	6	15	7.7	.3	12	1,561,090	4,951
Med.	50	2.5		700	120	-	200	400	4	4	7.6	.4	6	100,000	1,000

Station HBD-01 167th St. Thorn Creek River Above Mouth.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
Thru 1965															
Max.	90	13.0	140	1373	342		354	680		5.5	8.0	30.0	26	1,800,000	16,000
Min.	32	0.4	5	571	82		112	352		2.6	6.7	0.0	3	14,000	20
Ave.	56	5.3	26	1100	217		255	558		3.6	7.5	2.4	9	316,000	3,835
Med.	60	4.0	20	700	120		250	500		2.8	7.6	1.0	6	100,000	100
1966															
Max.	80	9.8	270	1568	428	275	400	720	13	50	7.9	1.0	32	4,100,000	24,000
Min.	38	.9	8	505	63	275	112	230	1	5	7.5	.0	4	20,000	100
Ave.	56	4.7	49	1023	214	275	245	528	5	23	7.7	.4	9	518,785	4,289
Med.	50	2.5	20	700	120	-	200	500	4	4	7.6	.4	6	100,000	1,000

Summary of Chemical and Bacteriological Data

Station HBD-02 Glenwood Thorn Creek River Below Bloom Twp.

Maximum limits under Water Quality Criteria for Little Calumet River Shown on next line.

Date	Water Temp.F	D.O. mg/l	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
	90°	2-4									6.5-9.0	0.5	10.0	5,000	500
Thru 1965															
Max.															
Min.															
Ave.	-	-	170	1201	215		232	440	2	48.8	7.2	0.4	14	500,000	19,000
Med.															
1966															
Max.	50	2.9	61	1781	596	230	372	652	5	45	8.6	.6	62	9,100,000	57,000
Min.	50	2.9	13	559	97	230	148	348	1	1	7.2	.0	4	26,000	100
Ave.	50	2.9	32	1154	254	230	283	536	2	30	7.7	.3	18	2,122,600	13,994
Med.	50	2.5	20	700	120	-	250	500	-	4	7.6	.4	12	1,000,000	1,000

Station HBD-03 Halsted St. Thorn Creek River Above Bloom Twp.

Date	Water Temp.F	D.O. mg/l	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
Thru 1965															
Max.															
Min.															
Ave.															
Med.															
1966															
Max.	45		280	1954	844	130	300	936	4	2.8	8.6	.5	13	900,000	17,000
Min.	45		6	385	75	130	108	216	1	.5	7.8	.0	2	1,000	130
Ave.	45		50	1050	356	130	193	559	2	1.3	8.1	.1	6	264,750	2,795
Med.	.45		-	700	120	-	150	400	-	.7	8.0	0	6	100,000	1,000

Summary of Chemical and Bacteriological Data

Station 02 HB Little Calumet River Wentworth

Maximum limits under Water Quality Criteria for Little Calumet River Shown on Next Line.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
	90°	2-4									6.5-9.0	0.5	10.0	5,000	500
1965															
Max.															
Min.															
Ave.															
Med.															
Thru	5 samples														
1967															
Max.	72	8.4	1000	821	49	170	200	380	20	2.5	7.8	0.8	11	200,000	13,000
Min.	31	3.0	11	374	27	105	84	168	6	1.0	7.4	0.0	3	44,000	1,100
Ave.	47	6.3	213	681	38	128	156	313	13	1.7	7.6	0.2	7	148,000	3,660
Med.	46	6.2	13	735	34	110	168	348	11	1.2	7.6	0.0	6	200,000	1,400

Station 03 HB Little Calumet River Torrence

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
1965															
Max.															
Min.															
Ave.															
Med.															
Thru	4 samples														
1967															
Max.	72	7.2	1500	823	51	135	200	368	14	3.0	7.7	0.6	10	300,000	14,000
Min.	32	3.0	10	367	25	130	88	168	13	0.6	7.4	0.0	3	79,000	600
Ave.	51	3.1	384	681	41	132	144	302	13	1.8	7.6	0.2	7	170,000	4,320
Med.	48	5.2	13	742	38	130	152	320	13	1.8	7.6	0.0	6	100,000	1,100

Summary of Chemical and Bacteriological Data

Station 04 HB Little Calumet River 159th St.

Maximum limits under Water Quality Criteria for Little Calumet River Shown on Next Line.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
	90°	2-4									6.5-9.0	0.5	10.0	5,000	500
Thru 1965															
Max.															
Min.															
Ave.															
Med.															
	5 samples														
1967															
Max.	74	7.2	1,000	1,229	129	170	208	468	15	9.0	7.7	1.6	9	400,000	12,000
Min.	32	2.0	8	641	61	100	112	232	8	5.0	7.4	0.0	3	58,000	400
Ave.	50	5.0	258	956	88	123	168	368	13	7.5	7.7	0.6	6	231,600	7,480
Med.	46	5.0	15	952	85	100	160	388	13	7.5	7.7	0.4	7	300,000	9,000

Station 01 HB Little Calumet River Ashland Ave.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
Thru 1965															
Max.															
Min.															
Ave.															
Med.															
Thru 1967	4 samples														
Max.	74	7.9	37	1,231	141	207	236	448	14	8.5	7.8	0.5	49	100,000	8,000
Min.	45	3.2	10	952	80	95	168	380	4	3.5	7.7	0.0	5	9,000	100
Ave.	56	6.1	19	1,096	107	167	405	417	9	6.0	7.7	0.2	16	40,250	2,620
Med.	52	7.8	17	1,050	90	200	212	428	9	3.5	7.7	0.3	6	15,000	700

Summary of Chemical and Bacteriological Data

Station 01 HBD Thorn Creek River 167th St.

Maximum Limits under Water Quality Criteria for Little Calumet River Shown on Next Line.

Date	Water Temp.F	D.O. mg/1	Turbidity	Spec. Cond. umhos/cm	Chloride	Sulfate	Alkalinity	Hardness	Nitrates	Phosphate	pH	MBAS	BOD	Coliform	Entrococcus
	90°	2-4									6.5-9.0	0.5	10.0	5,000	500
Thru 1965															
Max.															
Min.															
Ave.															
Med.															
Thru 1967	6 samples														
Max.	74	10.2	25	1828	209	260	284	536	28	14.2	8.2	0.7	10	400,000	24,000
Min.	23	1.0	8	1074	97	110	172	424	2	8.0	7.6	0.0	4	17,000	100
Ave.	44	5.9	16	1397	159	188	212	486	12	10.3	7.7	0.6	7	144,500	7,767
Med.	45	6.1	15	1383	170	160	208	468	8	10.0	7.7	0.4	7	100,000	3,200

Station 02 HBD Thorn Creek River Glenwood

Thru 1965															
Max.															
Min.															
Ave.															
Med.															
Thru 1967	3 samples														
Max.	60	10.2	17	1774	226	135	300	520	13	16.5	7.8	0.8	24	600,000	19,000
Min.	38	5.4	8	1097	106	113	176	400	12	11.0	7.7	0.0	3	200,000	950
Ave.	39	8.1	13	1370	156	124	229	452	12	13.7	7.7	0.4	12	367,000	8,417
Med.	48	8.9	10	1309	138	113	212	436	12	11.0	7.7	0.5	9	300,000	5,300

MR. STEIN: Are there any comments or questions?

MR. POSTON: Mr. Klassen, on the last page you talk about Homewood and Bloom Townships sewage works expansion and improvements to be completed in 1969.

Does this mean that you too are asking for an extension of the time schedule?

MR. KLASSEN: No. Bloom Township has secondary treatment and chlorination. They are expanding their plant, and so is Homewood, to take care of proposed expansions in that area.

Bloom Township had a Federal grant, and this is when their expanded plant will be completed.

MR. STEIN: Are there any further comments or questions?

(No response.)

MR. STEIN: If not, may we call on the Sanitary District, Mr. Egan?

STATEMENT OF JOHN E. EGAN, CONFEREE AND PRESIDENT OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, CHICAGO, ILLINOIS

MR. EGAN: Chairman Stein, Conferees, Ladies and

J. E. Egan

Gentlemen:

Attached is a detailed summary of progress reports recently presented to the Illinois Water Pollution and Water Resources Commission of the following subjects:

1. Deep Tunnel Project for Flood and Pollution Control.
2. Control of Industrial Wastes. (Calumet Region, which is attached.)
3. 10-Year Program for Financing.
4. Waterways Cleanup, Monitoring and Research.

One area of the District to a greater or lesser degree often affects the other, so I believe all the facts contained therein are pertinent. Because of their length I will not attempt to read them, but ask that they be made part of the record of our conference.

MR. STEIN: Without objection, they will be entered in the record as if read.

(The following documents were submitted for the record by Mr. Egan:)

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 . . . SUperior 7-8900

August 29, 1967

J. E. Egan

Honorable Carl L. Klein, Chairman
and Members of the
Water Pollution and Water Resources
Commission

PROGRESS REPORT ON WATERWAYS
CLEANUP, MONITORING, AND RESEARCH

Gentlemen:

Attached are:

1. PROGRESS REPORT ON CHLORINATION, NORTH SIDE SEWAGE TREATMENT WORKS, JULY 26, 1967 (pp 1-4)

Chlorination facilities went on line at the Metropolitan Sanitary District North Side Sewage Treatment Works on July 10, 1967, over 1-1/2 years ahead of the schedule set under the Proceedings of the Federal Water Pollution Control Act. December 1968, was the schedule for completion embodied in the Federal enforcement program as submitted by the Illinois State Sanitary Water Board. Such speed was possible by utilizing the effluent conduit and the North Shore Channel for the contact basins, thus obviating long and costly construction. The simplicity of this system is shown on the attached schematic diagram (p. 3) and the photo montage (p. 4). The chlorine is simply injected into the effluent channel, which, together with the North Shore Channel, form the contact basin in which the chemical kills the bacteria. Further, as shown on page 1, the construction costs for this unique design show a savings of over 52 to 1, when compared to the standard design for chlorine contact basins.

2. BACTERIA REPORT (pp. 5-7)

North Side Sewage Treatment Works chlorination facilities went on line July 10, 1967. Studies since that time through August 16 have shown that chlorine dosages of about 1-1/2 parts per million will reduce the bacteria count below the usual standard of 5,000 coliforms per 100 mls. of effluent, or river water. Should it become desirable to have greater kills of bacteria during the recreational season, the dosage can simply be increased. But the 1-1/2 parts per million is extremely low for secondary effluents, the usual figure being in the neighborhood of 5 to 8 ppm. This is because of the high quality of the plant effluent, and the lower organic demands. To date, the system is proving to be extremely efficient, in addition to the low construction costs. Only about 1200 feet of the North Shore Channel need be utilized as a contact basin to attain the 30-minute contact between chlorine and bacteria, and to get the required bacterial reduction.

J. E. Egan

3. NEWS RELEASE RE HANOVER TERTIARY WASTEWATER FACILITY, DATED AUGUST 29, 1967, (pp. 8-18)

Under construction at a cost of $1,126,000, this facility is a major step in the District's fight against water pollution. The first of its kind and size in the nation, it will be on line early in the spring of 1968. Utilizing chemicals, sedimentation, and sand-filtration similar to a water treatment plant, this tertiary plant will produce an effluent that is more than 99% "pure". At present, secondary treatment used throughout the country produces an effluent from which about 90% of the impurities have been removed.

The Hanover Tertiary Plant will have a rated capacity of 2,000,000 gallons per day, which is over 20 times larger than any of the similar facilities so far constructed by the Federal Government for research and demonstration purposes. The figure on page 11 shows the 72' x 242' building in which the facilities shown on page 12 will be housed. Photos 13 through 17 are of construction under way, while photo 18 is of the micro-strainer imported from England in the search for new and cheaper tertiary methods. It alone represents a cost of over $98,000.

From the Hanover Tertiary Plant, the District will get design, loading, labor, chemicals, costs, performance, and other criteria needed in the design of the facilities at the three large plants of the District. While others are talking about tertiary treatment, the Sanitary is building the first of its kind in the nation.

4. INTEGRATED WATER QUALITY DATA ACQUISITION SYSTEM (p. 19)

In the past, in order to determine the condition of the inland waterways, the District made frequent boat and sampling surveys. Additionally, one automatic sampling and dissolved-oxygen analyzing station was maintained at Lockport. The data from these surveys were used to budget and regulate the direct diversion water for maximum use of it. The regulation could be characterized as somewhat a "from the seat of the pants" operation.

Nowadays, automatic sampling, analyzing, recording, and transmitting cells are available to measure dissolved oxygen, temperature, pH, chlorides, turbidity, sulfates, total solids, solar radiation, and other parameters of water quality. Taking advantage of these modern developments, the Sanitary District has contracted at a total cost of $402,700 for the eleven-station program shown on the map on page 19. These stations will measure the quality of the water at the three intake points (Wilmette, Chicago River, and Calumet River), at the three major treatment plants, and at five key points on the waterways system. Samples will be taken and analyzed at approximately 15-minute intervals, and will be telemetered into the nearest sewage treatment plant, and all results will be telemetered into the headquarters office. A computer will analyze and report on waterways conditions as they are measured, and appropriate alarms will be sounded when conditions become critical. Naturally, the ideal eventual application will be to use the river conditions to determine how much water must be diverted to maintain prescribed water quality conditions.

The contract for the housing at the stations where housing is not already available, was let some months ago, and will be completed shortly. The electronic equipment for the actual sampling, analyzing, and reporting has a completion date of May 21, 1968.

Although similar systems have been operating elsewhere, such as on the Ohio River and its tributaries, this is undoubtedly one of the most intense applications for a small area in the nation, if not the world. From this system not only will the District know the immediate condition of the waterways, but it will be able to measure the results of increasing or decreasing diversion water or the results of new treatment processes. It will give us a base from which to measure total progress in upgrading the waterways in future years.

5. RADIATION RESEARCH (Pages 20-23)

The Sanitary District is the first agency, private or governmental, to initiate extensive research on the possibility of using nuclear radiation, in the form of gamma rays, to fight water pollution and to improve treatment processes. This is described on pages 20 through 23. Purdue Research Institute is studying the possibility of applying radiation to the conditioning, stabilizing, and disinfecting of raw and digested sewage and sludge. At Battelle Memorial Research in Richland, Washington, research is under way to establish design criteria for treatment of effluents containing phenolics, cyanides, petroleum-related wastes, and bacteria. Each project costs a little over $50,000, for which purpose the District has applied for Federal Grants totaling $107,600.

To round out the research in this field, the District is seeking a third institute and project which will develop the methods of application, should the processes prove effective and economical. Page 23 shows graphically the initial thoughts as to the method of application. The wastes to be treated would simply be passed through an underground U-tube, being exposed to gamma rays from spent fuel cells from nuclear power plants. No radioactivity is imparted to the sewage or sludge in passing through the exposure area. It is the same process and type of radiation that is used to sterilize foods, perishables, medical and surgical supplies and instruments, and in pasteurizing food.

Very truly yours,

/s/ Vinton W. Bacon

General Superintendent

encl: 5

* * *

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 . . . SUperior 7-8900

July 26, 1967

To the President and Members
of the Board of Trustees
Office

PROGRESS REPORT ON CHLORINATION
NORTH SIDE SEWAGE TREATMENT WORKS

Gentlemen:

Chlorination facilities went on line at the Metropolitan Sanitary District North Side Sewage Treatment Works on July 10, 1967, over 1-1/2 years ahead of the schedule set under the Proceedings of the Federal Water Pollution Control Act. December, 1968, was the schedule for completion embodied in the Federal enforcement program as submitted by the Illinois State Sanitary Water Board. Such speed was possible by utilizing the effluent conduit and the North Shore Channel for the contact basins, thus obviating long and costly construction. The simplicity of this system is shown on the attached schematic diagram and the photo montage.

The savings in construction costs is dramatic when compared with chlorination facilities which include 30-minute detention contact basins - which is usually the standard design. The Calumet Sewage Treatment Works chlorination facilities are under construction at a contract cost of $1,844,000 for 220 mgd dry weather capacity. The North Side contract cost was $48,573 for 300 mgd capacity. When reduced to cost per unit capacity, the cost savings is 52 : 1.

$$\text{Calumet Plant:} \quad \frac{\$1,844,000}{220 \text{ mgd}} = \$8,380/\text{mgd capacity}$$

$$\text{North Side Plant:} \quad \frac{\$\ \ 48,573}{300 \text{ mgd}} = \quad 162/\text{mgd capacity}$$

The Federal Water Pollution Control Administration reports the costs of construction of chlorination facilities for secondary effluents as $16,000/mgd for two local chlorination facilities in the capacity range of 10-30 mgd, $10,000 for a 5 mgd facility, and $21,000 for a 1 mgd facility.

Thus the capital savings are overwhelming where plant channels and receiving waters can be used for contact between chlorine and sewage-effluent bacteria. (Calumet was designed for concrete contact basins on the plant site because the Calumet River is already used extensively for recreational purposes, and because of other factors which might interfere with the chlorination process, including the industrial waste load.)

At the rated capacity of 300 mgd at the North Side Plant, a 9-minute detention is achieved in the effluent conduit. Twenty-one minutes of detention is achieved in 2,000 feet of the North Shore Channel - the receiving waterway. Dilution in the North Shore Channel will average less than 1 to 1 with Lake Michigan low-demand water. Summer-long tests are under way to determine the efficacy of the system.

Prior to construction at the North Side Plant, chlorine kill studies were run on the plant effluent for over a year. On the basis of a 30-minute detention, the studies showed that the desired bacteria kill (that is, standards), could be met with an annual average dosage of 0.7 mg/l, and a summer average dosage of 0.8 mg/l. These are extremely low dosages, made possible by the high quality of the plant effluent. Somewhat higher standards, and thus chlorine dosages, will be required by upgrading the North Shore Channel waters to recreational use. Our Research and Development

Department is recommending higher dosages (1.8 mg/l), in initial operations to give added protection, and to offset any unknown chlorine demands from bottom deposits and the dilution water. The Research and Development Department will continue dosage-kill studies until the greatest efficiency at the lowest dosage for varying flow and sewage strength conditions is achieved.

The North Side Plant is the first of the District's three large plants to provide chlorination. The Calumet Plant should be on line before the end of the year, or one year ahead of schedule.

The West-Southwest Plant, with a dry weather rated capacity of 900, must be on line by July 1972. This should pose no problems in time if the Sanitary and Ship Canal is used for the contact basin. Here again, the dilution ratio is approximately 1 to 1, so the length of canal dedicated for use to the final waste treatment process is 1,000 feet. The capital cost savings should exceed $7,000,000 by using the Sanitary and Ship Canal for the contact basin.

Solely from the point of view of safety considerations, both North Side and Calumet are designed to use sodium hypochlorite.

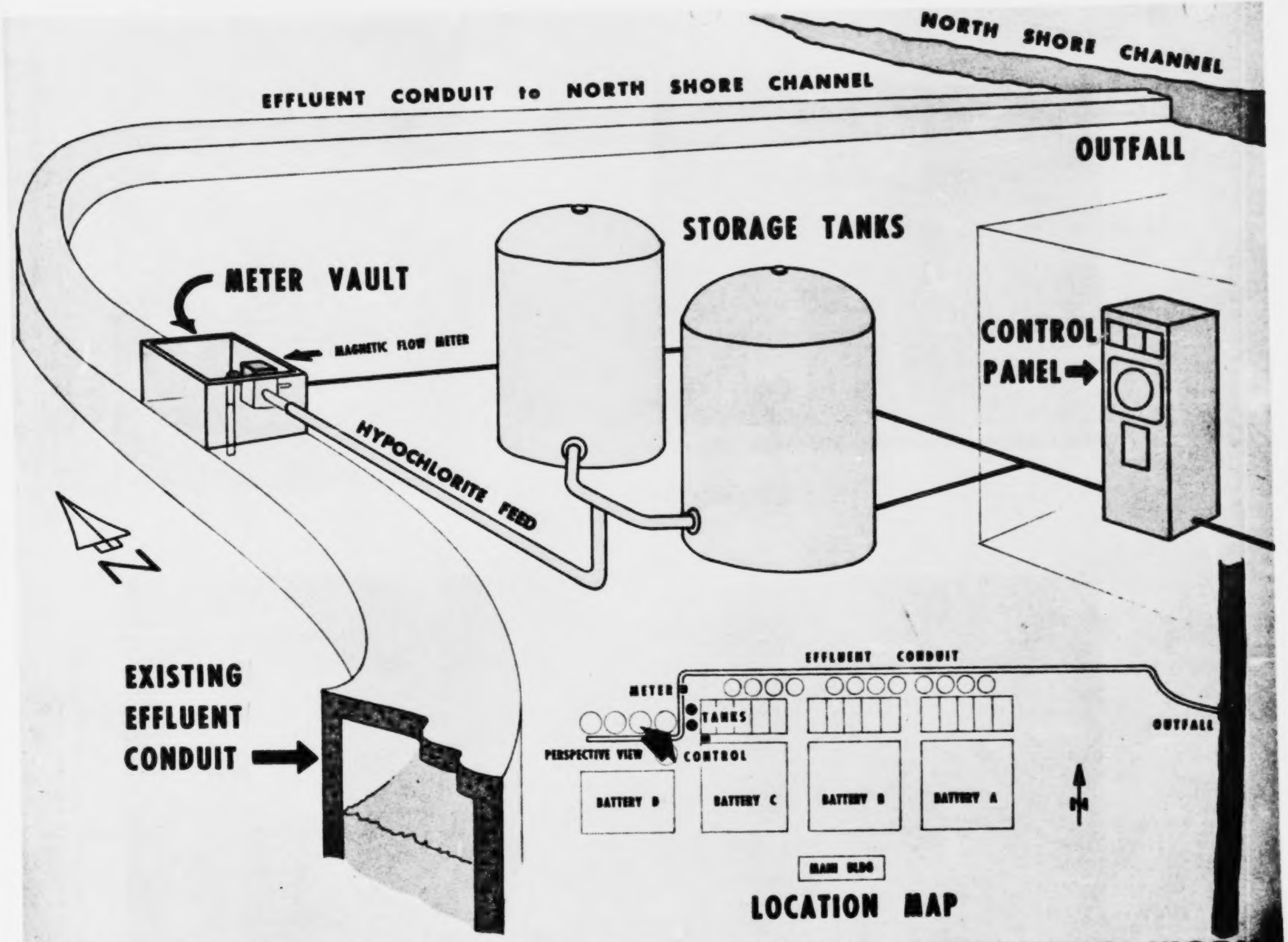
It is a pleasure to be able to give you an ahead-of-schedule report on installation of the chlorination facilities at our major plants.

Very truly yours,

/s/ Vinton W. Bacon

General Superintendent

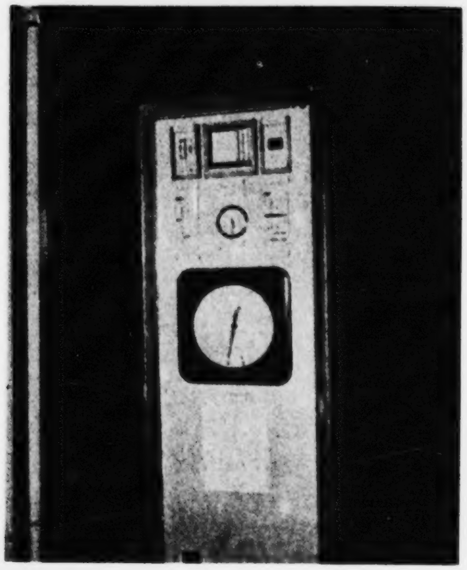
encls: 2



CHLORINATION AT NORTH SIDE SEWAGE TREATMENT WORK

CHLORINATION
NORTH SIDE SEWAGE TREATMENT WORKS
300 MGD CAPACITY (dry weather flow)

Sodium hypochlorite storage tanks, 11,000 gallon capacity each.



Single control panel, Fisher-Porter Chlorination Feed and Control Equipment.

Meter vault immediately above effluent conduit.
9 minutes of contact in effluent conduit.

Effluent conduit outfall at North Shore Channel. Dilution no more than 1 to 1 with Lake Michigan water. 21 minutes of contact provided in 2000 feet of channel.

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

100 East Erie St., Chicago, Illinois 60611 . . . SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
OFFICE

RE: BACTERIA REPORT

Dear Sir:

Prior to the design and construction of the chlorination facilities at the North Side Sewage Treatment Plant, the Department of Research and Development was called upon to work on the unique feature of using the effluent conduit and the North Shore Channel as contact basin. Their task was to develop design criteria pertaining to chlorine dosage and contact time. The primary goal was to disinfect the plant effluent, within the conduit and North Shore Channel, so that the bacterial count would be 5,000 coliforms per 100 mls. of effluent.

Laboratory studies indicated that using the conduit and receiving streams was highly feasible and that with a contact time of thirty minutes and on an annual average, the dosage required would be 0.7 mg/l. The required summer dosage was found to be 0.8 mg/l.

On July 10, 1967, the chlorination system was ready for operation. The Department of Research and Development carried out field surveys designed to regulate dosages and ascertain degree of disinfection. A number of minor problems pertaining to the operation of the equipment were required to be solved and within the past few weeks the operation is now running smoothly.

A preliminary dosage of 1.8 mg/l of chlorine was recommended by Research and Development for the purpose of assuring that the upstream chlorine demands would be satisfied. Within the last two weeks it has been found that at a one to one dilution of plant effluent and river water, a dosage of 1.6 mg/l was required to attain a value of 5,000 coliform per 100 mls. of plant effluent within the receiving waters. Contact under these conditions was nine minutes in the conduit and twenty-one minutes in the receiving waters. This represents a river length of approximately twelve hundred feet. The results of more recent runs are shown in Table I. This work will be continued for the purpose of ascertaining dosages at different river flows and temperature conditions.

From these studies it is concluded that the utilization of the receiving waters in the North Shore Channel, as a contact basin, is a successful and practical approach. It offers considerable degree of flexibility and it is only a matter of increasing the dosages of chlorine to obtain recreational standards. Another important feature is the low cost of construction for this facility. The contract cost of the North Shore operation was found to be $162/mgd capacity while for the Calumet facility, which involves the installation of a contact basin, it was found to be $8,380/mgd capacity.

Yours very truly,

/s/ Jerome E. Stein

Director of Research and Development

JES/pd

TABLE I - CHLORINATION RESULTS

NORTH SIDE TREATMENT PLANT

DATE	Chlorine Dosage (mg/l)	Total Coliform 30 Minute Contact
8-1	1.4	2,000
8-2	1.6	24,000*
8-3	1.5	4,600
8-7	1.6	14,000*
8-8	1.4	4,000
8-9	1.6	4,000
8-10	1.6	285
8-11	1.6	<100
8-14	1.6	4,500
8-15	1.6	4,500
8-16	1.6	1,600

* Standard of 5,00 coliforms per 100 mls. of effluent not attained because storm overflow resulted in high chlorine demand. In future overflows will be compensated by increasing chlorine dosages.

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

100 East Erie St., Chicago, Illinois 60611 . . . SUperior 7-8900

August 28, 1967

FOR: IMMEDIATE RELEASE

SANITARY DISTRICT FIGHTS POLLUTION WITH CONSTRUCTION OF TERTIARY WASTE WATER FACILITY

The Metropolitan Sanitary District of Greater Chicago is taking a major step forward in its fight against water pollution with the construction of a 'tertiary' waste water treatment facility that is the first of its kind in the nation.

The plant is being constructed at a cost of $1,126,000 in the district's Hanover Water Reclamation Works, Hanover, Illinois. It will be on line by early spring 1968.

The tertiary treatment will produce waste water that is more than 99% "pure". Present secondary treatment used throughout the country produces water that is 90% pure.

District General Superintendent Vinton W. Bacon said that increasing population densities and industrial activity demand more efficient and advanced methods of waste treatment.

Bacon noted that tertiary treatment is a major part of the district's recently started 10-year plan designed to clean up the six inland waterways and tributaries within its boundaries and to maximize all water uses in the area.

J. E. Egan

Tertiary treatment, at a 10-year project cost of $300,000,000, will be under way by 1971, Bacon said. Much of this will be offset by federal and state funds, he noted. Other steps in the 10-year timetable call for chlorination at all waste treatment plants by 1968, removal of visible and settleable solids by 1969, and combined sewer separation or its equivalent under way by 1972.

The plan is designed to make inland waterways fit for such uses as fish and wildlife habitation, irrigation, boating, and to some degree, swimming.

Hanover is one of the district's eight small waste water treatment plants (that supplement three large facilities) and serves 15,000 persons in the northwest area of Cook County.

Bacon said that tertiary treatment of the waste water, which empties into the DuPage river, will produce an effluent that "little children can play in".

The tertiary process involves chemical dosage, flocculation, settling, and agitation of rapid-sand filtration, chlorination, and post-aeration to satisfy any remaining oxygen demand.

The Hanover tertiary plant will have a rated capacity of 2,000,000 gallons (m.g.d.) per day to coincide with the primary and secondary treatment stages within the complex. It will be entirely housed in a 72' x 242' building.

J. E. Egan

Bacon said that the Hanover tertiary plant will not only function as a full-scale operating plant, but will serve as an experimental station for future tertiary installations throughout the district.

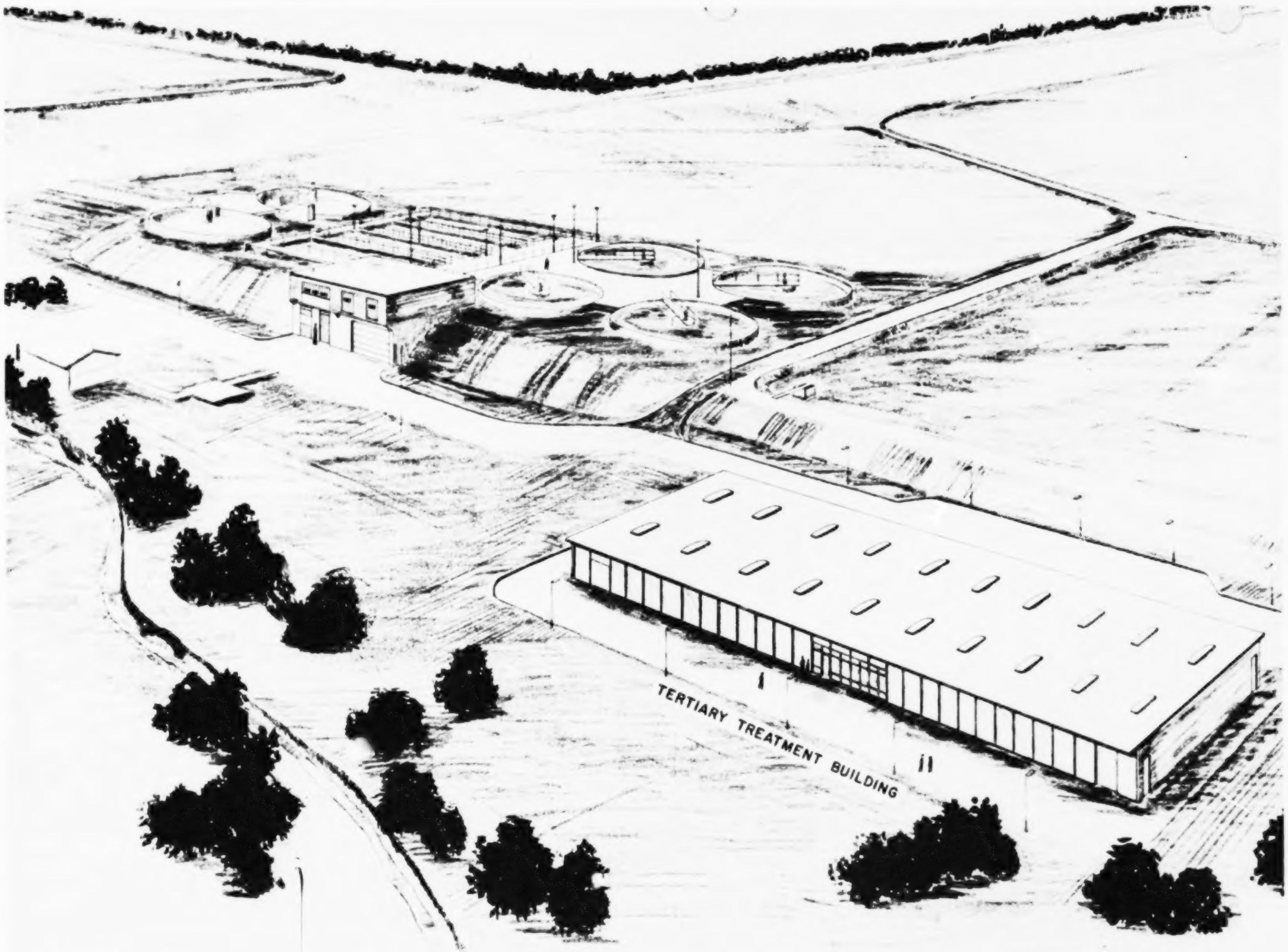
In line with such experimentation, the district is installing two separate but parallel tertiary treatment processes. One, a traditional rapid-sand filtration process, will remove 8 or 9 percent of the solids still remaining in the domestic sewage after secondary treatment.

The other involves use of a relatively new microstrainer, which was imported from Crane-Glenfield, the Scottish subsidiary of Crane Company, early in August.

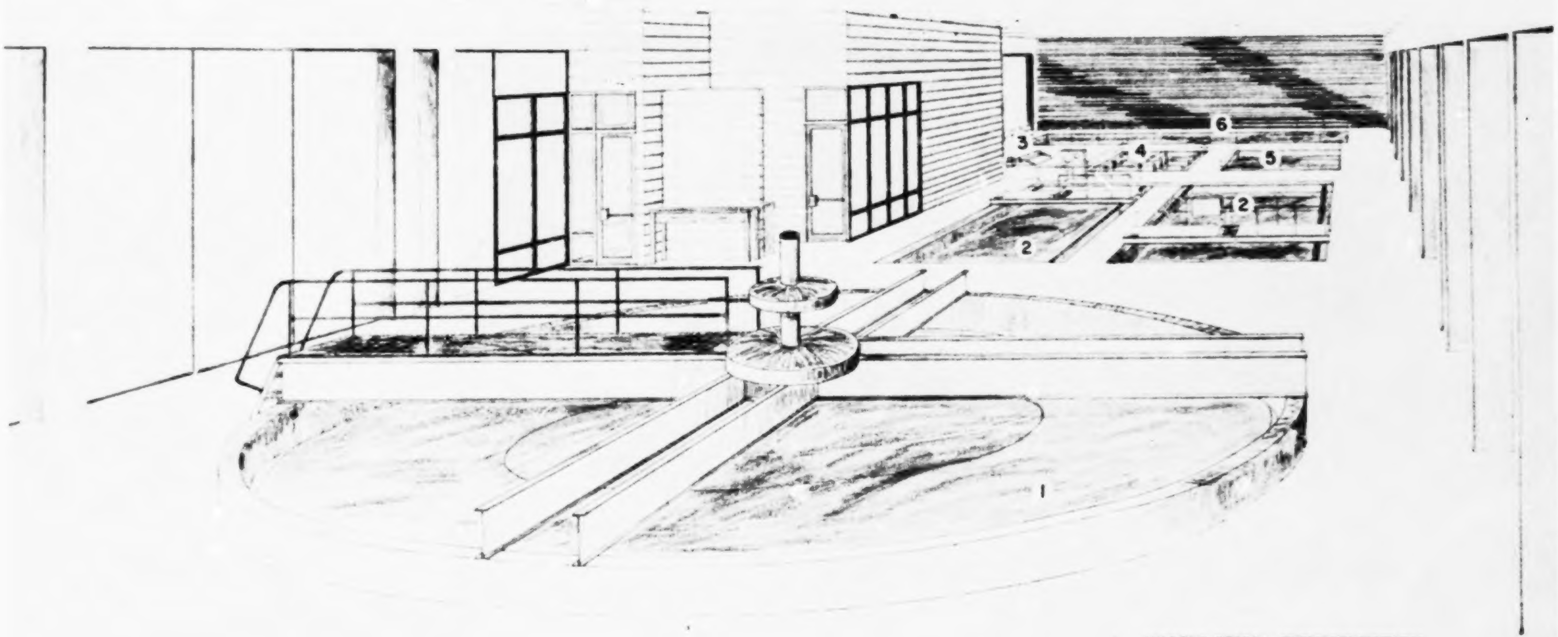
The microstrainer, bought for $98,000, is expected to remove 5 or 6 percent of the remaining solids after secondary treatment.

If the microstrainer proves to be sufficient, a substantial savings in future installations could be realized, Bacon said.

He noted that microstrainers have been in use for years at Luiten on the River Lea, 20 miles above the intakes for the London water supply in England.



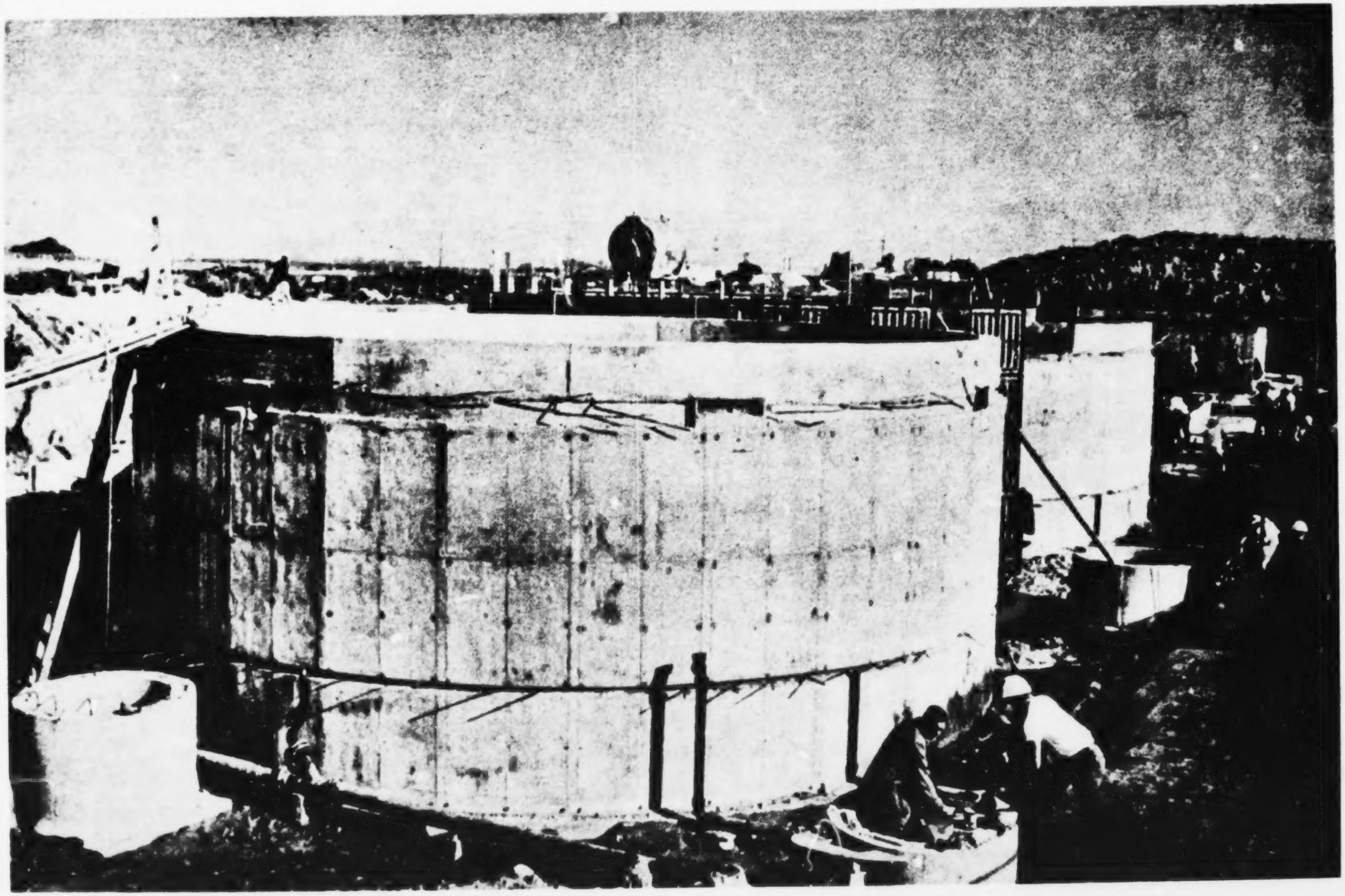
HANOVER TREATMENT WORKS



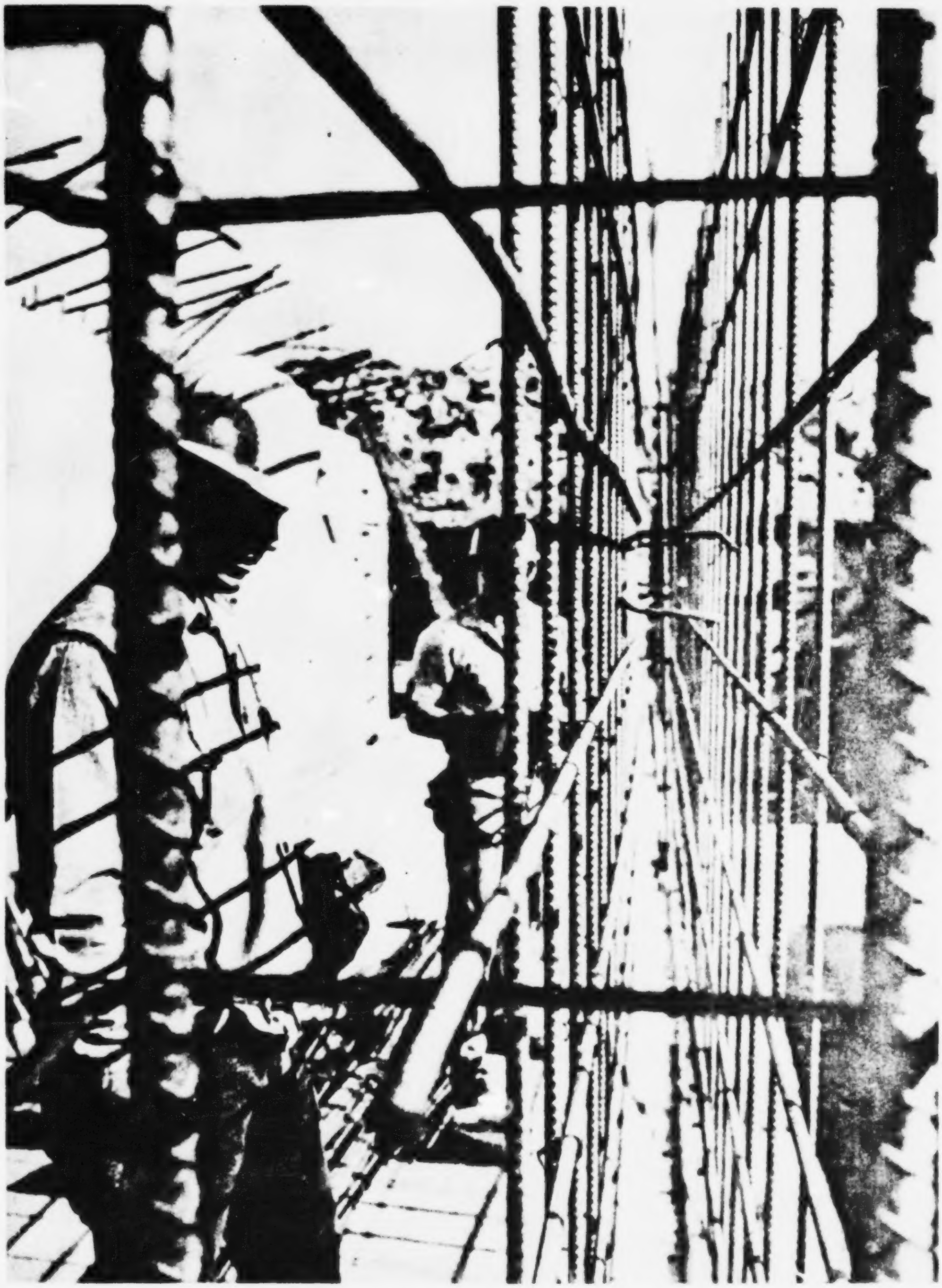
1. COAGULATION-SEDIMENTATION TANK NO. 2
2. SAND FILTER
3. MICROSTRAINER
4. CHLORINE CONTACT TANK
5. POST AERATION TANK
6. EXPERIMENTAL BAY

TERTIARY TREATMENT BUILDING

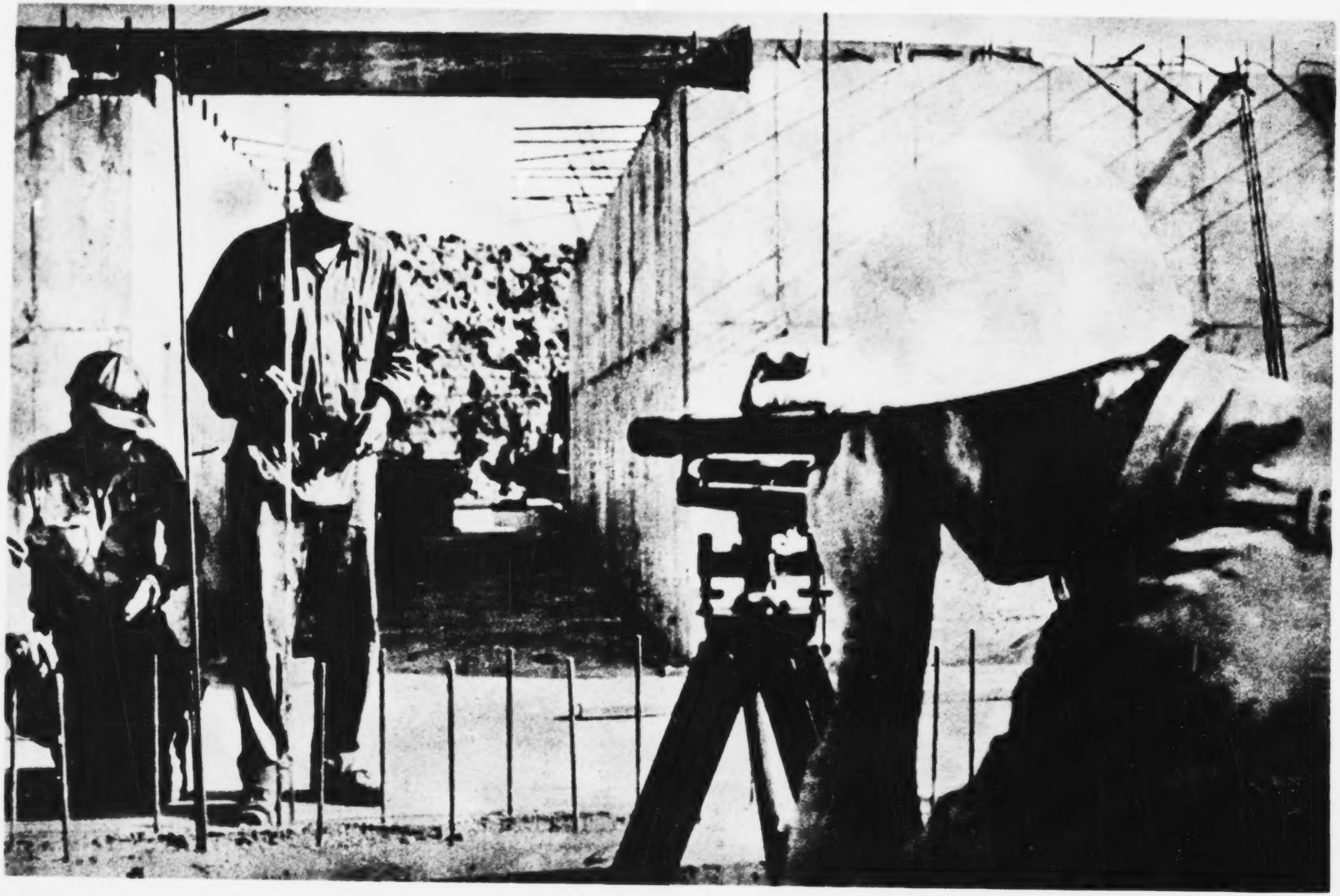
HANOVER TREATMENT WORKS



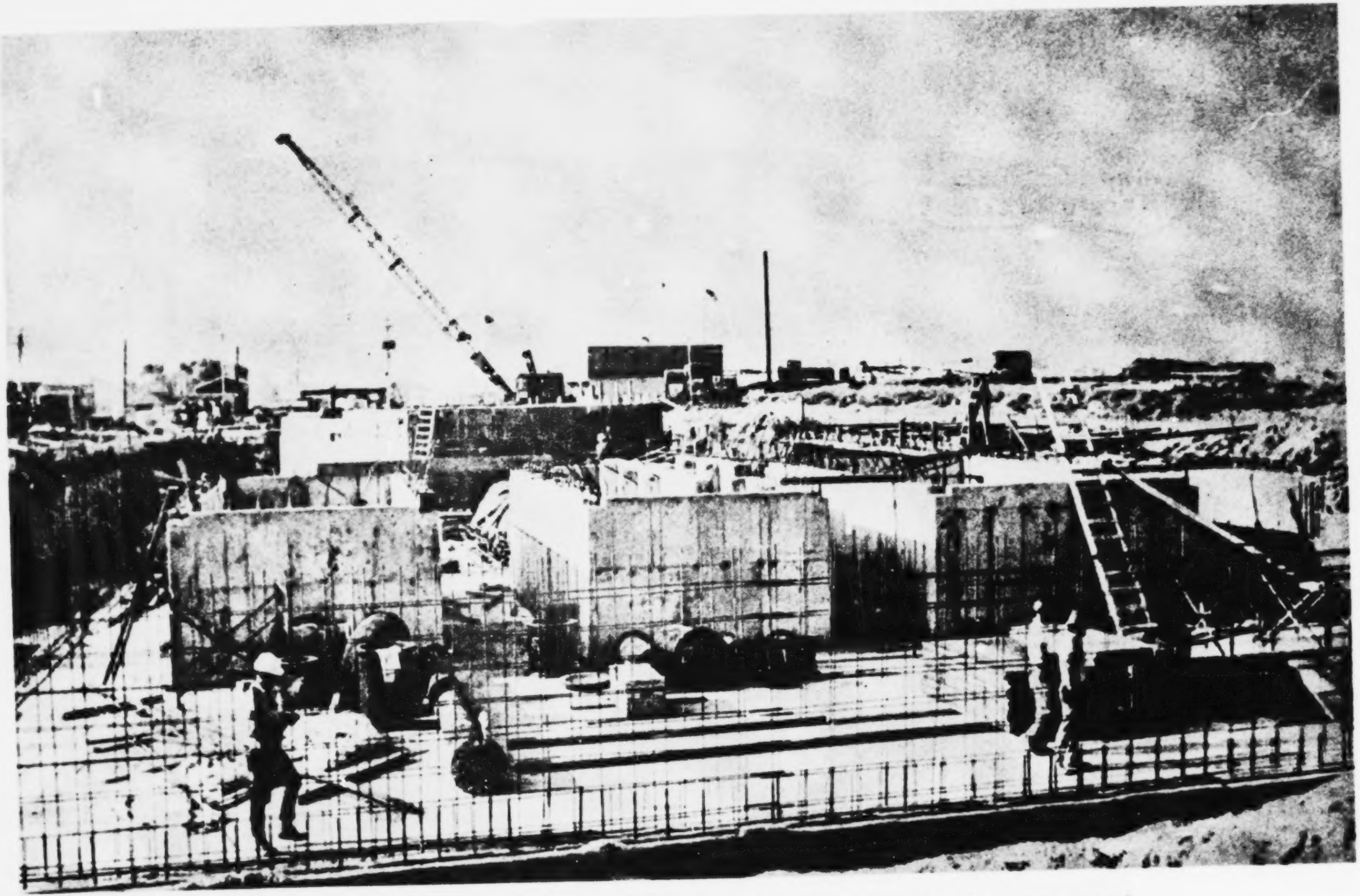
The coagulation and sedimentation tanks in the new Hanover Tertiary Treatment Building have diameters of 35-feet and 50-feet and have capacities in excess of 180,000 and 200,000 gallons respectively. Workmen are preparing to pour the outside walls.



Tying re-inforcing rods in the outside wall of the Hanover Tertiary Treatment Building are (l. to r.) Nicholas Lemaich, 9743 Commercial, and Ted Katta, 4256 N. Tripp, both of Chicago. The outside walls are about to be poured.

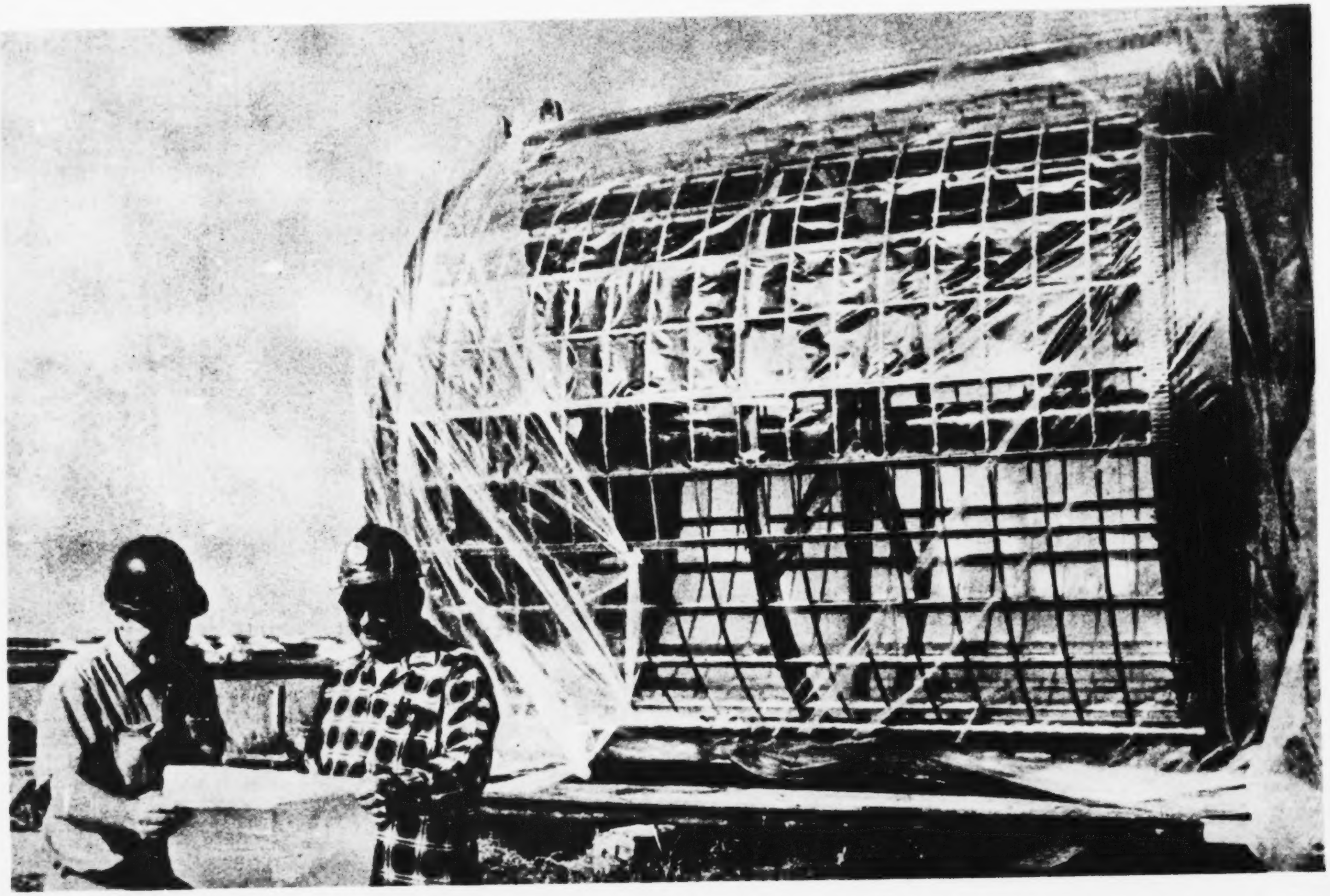


Engineers check levels prior to casting the sand filter wall in the Hanover Tertiary Treatment Building. Sighting the level is Bill Rauschenberg, 5838 North Madinah, Chicago. Assisting are (l. to r.) Robert Timme, Des Plaines, Ill.; and Robert Luker, Elgin, Ill.

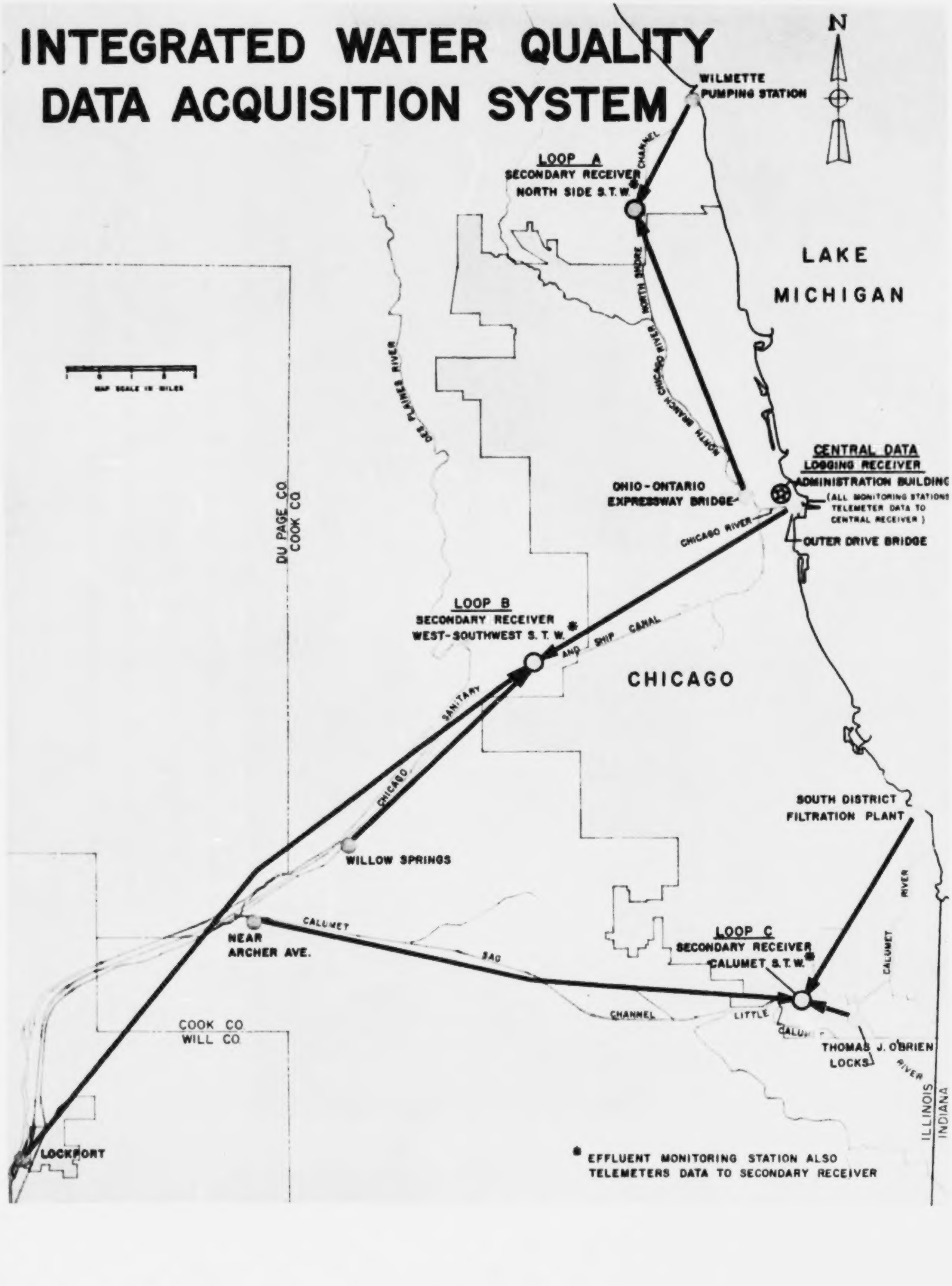


Walls of the new Hanover Tertiary Treatment Building are about to be poured around reinforcing rods. In the background are the rectangular concrete placements for the aeration, chlorine and microstrainer tanks.

A construction worker uses a compactor to smooth the earth around the coagulation and sedimentation tanks in the new Hanover Tertiary Treatment Building. Handling the device is Harvey Sholton, Elgin.



The Hanover District's new microstrainer, first of its kind in the country, is wrapped in protective plastic prior to installation in its concrete housing. Checking plans for installation are (l. to r.) Steve Hoag, Treatment Plant Operator and Peter Klockany, Resident Engineer.



INTEGRATED WATER QUALITY DATA ACQUISITION SYSTEM

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 14, 1967

FOR: IMMEDIATE RELEASE

The Metropolitan Sanitary District of Greater Chicago is studying the possibility of using nuclear radiation, in the form of gamma rays, to fight water pollution.

The district is the first agency, private or governmental, to initiate such a proposal. The agency contracted with two research groups, one at Purdue University, and the other at the Pacific Northwest Laboratory of Batelle Memorial Institute in Richland, Wash.

District general superintendent Vinton W. Bacon said increasing population densities and industrial activity demand more efficient and advanced methods of waste treatment. These expected volumes of wastes will probably exceed known capabilities of biological treatment, and new approaches must be investigated.

The district hopes to use gamma rays, which are identical to X-rays except in their source, to help convert wastewater into water suitable for drinking and swimming. The gamma rays will not cause the treated water to become radioactive; consequently it will be safe for swimming and non-lethal to the fish population.

J. E. Egan

The commercial and governmental use of radiation has been increasingly widespread in recent years, but little application has been made into the possibilities of treating sewage or industrial wastes.

The district found ample evidence of radiation to sterilize medical supplies, treating wood-plastic products and pasteurizing food, but no published references specifically to work with industrial wastes, especially the pollutants cyanides and phenols.

If research at Purdue and Batelle prove fruitful, the district hopes to construct a pilot pollution treatment plant at Argonne National Laboratory. Each study will cost about $50,000. To support these projects, the district has applied for Federal grants totaling $107,600.

The district foresees that radiation would be used in combination with standard anti-pollution equipment. The radiation plant would be in the shape of a giant U-tube, built underground to protect persons on the surface, through which polluted water would be directed and treated by the gamma rays.

The Purdue research will be toward applying radiation to the conditioning, stabilizing and disinfecting of raw and digested sewage, sludge, and also activated sludge.

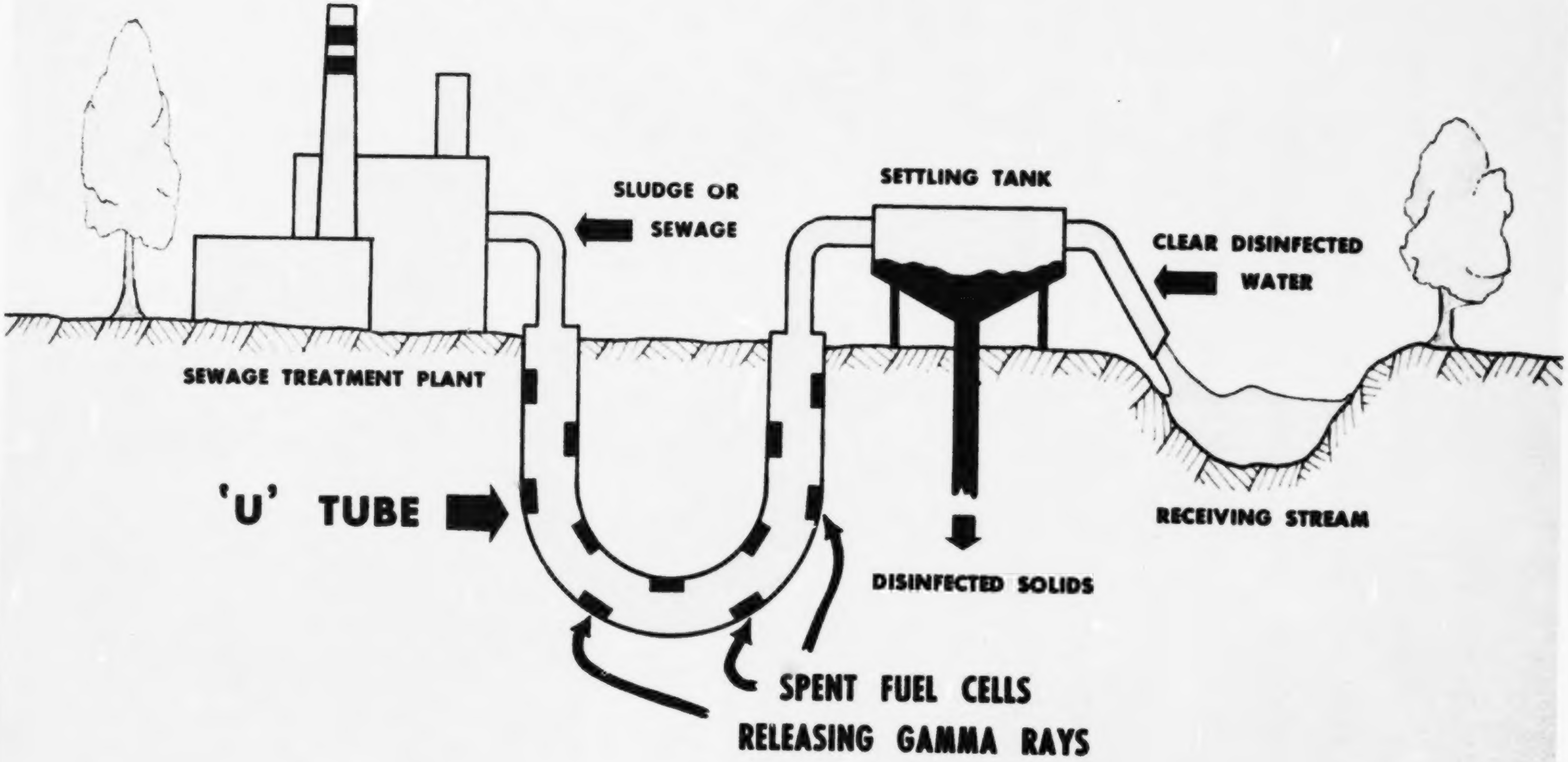
At Batelle, initial research would be taken to establish design criteria for treatment facilities aimed primarily at the effects of radiation on effluents containing cyanides, phenolics and petroleum related wastes.

Officials at Batelle cautioned that problems will be encountered if only because there is so little experience in employing radiation to treat contaminants in municipal and industrial wastewaters. But they feel there is sufficient evidence that such treatment might offer economical solutions to some of the more difficult problems in water pollution control.

-0-

For information contact:

Vinton W. Bacon
100 East Erie
Chicago, Illinois 60611
SU 7-9404
8/14/67



TREATMENT BY RADIATION

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

The Honorable Carl L. Klein, Chairman,
and Members of the
Water Pollution and Water Resources Commission
State of Illinois

PROGRESS REPORT ON DEEP TUNNEL PROJECT FOR FLOOD AND POLLUTION CONTROL

Gentlemen:

Attached are:

1. Chronological Summary, August 29, 1967, Pages 7 through 11

Exhibit 1, CHICAGOLAND DEEP TUNNEL PLAN	p. 7
Exhibit 2, FLOOD RELIEF PROJECT	p. 8
Exhibit 3, CHICAGO DEEP TUNNEL SYSTEM	p. 9
Exhibit 4, AQUIFER PROTECTION	p. 10
Exhibit 5, CHICAGOLAND FLOOD CONTROL	p. 11

PLANS COMPARISON

Exhibit 5 is extremely important (p. 11) in that it shows that the deep tunnel project is the only one of the five studied by the Sanitary District which fulfills the eight following objectives:

Protect Lake Michigan

Reduce channel flood flows
Reduce basement flooding
Reduce pollution from overflows
Improve degree of sewage treatment
Increase recreation uses
Produce electric power
Provide other benefits

Exhibit 5 also shows that other proposals fall short, some far short, of the above objectives. In fact, none of the other proposals gives the equivalent of sewer separation, thus reducing pollution of waterways from overflows, and none gives improved degree of sewage treatment or the possibilities of treatment of combined sewer overflows.

2. Special Progress Report on Sanitary Engineering Aspects, August 15, 1967, pages 12-17.

Originally the combined sewage - storm water in tunnel was to be pumped to storage reservoirs and thence to the waterways with minimal treatment. With the recently established waterways standards, tertiary treatment will be required. This progress report sets forth the basic concepts and requirements, and it emphasizes the great advantage of the tunnel and reservoir system which "gets its hands" on the wastes long enough so that adequate treatment can be provided.

The prefeasibility study was completed in May 1966, at a cost of approximately $130,000.

The feasibility study now underway will be completed April 1968 at a total cost of $2,370,000 which will include approximately $1,850,000 for soil and rock boring and seismographic work. The breakdown is as follows:

Harza-Bauer Studies	$520,000
Rock Boring	550,000
Seismographic Survey	1,300,000
	$2,370,000

The engineers making the study estimate that the first contract can be awarded in 1969 and that operation can start in the first zone in 1972. Purchase of surface reservoir sites will be recommended to the Board of Trustees very soon.

Very truly yours,

/s/ Vinton W. Bacon

General Superintendent

Encls. 2, pp. 1-17

* * *

J. E. Egan

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

CHICAGOLAND DEEP TUNNEL PLAN

ENGINEERING PROGRESS REPORT

HARZA ENGINEERING COMPANY

BAUER ENGINEERING, INC.

August 29, 1967

Chronological Summary

The basic ideas of the Deep Tunnel Plan for pollution abatement and flood control were conceived by Dr. William J. Bauer, President of Bauer Engineering, Inc. The concept was reviewed and modified by the Harza Engineering Company, at which time the idea of hydroelectric power generation was added. In 1964, the two companies, in association, proposed that the Metropolitan Sanitary District of Greater Chicago authorize engineering investigations. A pre-feasibility study, with the objective of determining the merit of more detailed engineering investigations, was carried out between November 1965 and May 1966. In May 1967, the District authorized the engineering planning studies which are presently under way by Harza and Bauer.

The first concept of the project placed strong emphasis on flood relief, particularly at the neighborhood level. In recognition of the District's accelerated program for waterway pollution abatement, present planning is emphasizing protection of the waterways against pollution, with extension of the system for neighborhood flood relief to follow at a later date.

Deep Tunnel Plan Concepts

Storm water and domestic sewage are carried by the same sewers in much of the Chicagoland area. During moderate and heavy rainstorms, these combined sewers overflow, carrying rainwater mixed with raw sewage directly into the area's rivers and channels. Under severe conditions overflows occur into Lake Michigan. Because of the flat topography, the lateral and main sewers give inadequate protection against basement and underpass flooding in many cases.

Storage of floodwaters in reservoirs is a solution widely used for flood protection. The water is first stored, then released under controlled conditions. Space for conventional reservoirs is, however, seldom available within an established urban area. The increase in use of excavated chambers for storage of gas led to the concept of storing flood waters underground close to their point of origin. Excavation of underground storage space in the form of an interconnected tunnel system can provide both storage and a conveyance system for collection of waters to a convenient location of treatment and discharge.

Description of the System

The tunnels comprising the underground storage reservoir will generally be located under the waterways, rivers, or public rights-of-way in the metropolitan area as shown schematically on Exhibit 1. Overflows from combined sewers, which presently discharge into the waterways, will be directed into vertical shafts. These shafts will be connected to tunnels excavated in solid rock, some 700 to 800 feet below the surface. The location of the underground reservoir has been selected to make use of a rock formation that will not require structural bracing or tunnel lining. Later extension of branching tunnels into the areas between waterways will allow interception of excess flows within the sewer network and will have the effect of greatly increasing sewer capacity without replacing the sewers.

A pumping station, located in a chamber in the rock, will transfer water from the underground reservoir to a surface reservoir to be built in open space areas near Lake Calumet. The pumps and their electric motors will be reversible so that they can also operate as turbines and generators. In addition to the removal of storm water, the reversible pump-turbine station will operate as a "pumped-storage" hydroelectric plant. Water would be dropped from the surface during the day to generate high-value peaking power and pumped back up at night using low-cost off-peak power. A generalized cross-section of the Deep Tunnel System is shown on Exhibit 2.

The concept of the Deep Tunnel Plan during the prefeasibility stage included provisions for treatment of the stormwater overflows by conveying these flows from the upper reservoir to the Calumet Treatment Plant. Although final decisions have not been made, the present studies indicate that it probably will be more desirable to provide special treatment facilities for the stormwater overflows at the upper reservoir.

Under the present concept, the contaminated, combined-sewer overflow waters will undergo grit removal in the underground reservoir. Aeration would be provided in the upper reservoir and could also be provided during the pumping and generating cycles. Excess water will be passed through a final settling tank and tertiary treatment before discharge to the waterway system. Grit and sludge from the upper and lower reservoirs will be disposed of by conventional means. A schematic flow diagram of the functioning of the Deep Tunnel Plan is shown on Exhibit 3.

Groundwater Protection

The underground storage and conveyance system will be located in a relatively unproductive section of the "deep aquifer". This aquifer is heavily used and its piezometric level, although now generally higher than the tunnels, may fall below the tunnel level in a few years in some areas. For positive protection of this important aquifer, a recharge system to maintain the piezometric level higher than the tunnels will be installed as shown schematically on Exhibit 4. Since the tunnels are designed to be at atmospheric pressure, the higher water pressure in the rock will guarantee steady inflow of groundwater into the tunnels with no possibility of outflow of contaminated water.

Proper recharge of the deep aquifer will prevent the decline of the water table in the area of the tunnels. On a general area basis this will improve the groundwater situation and will contribute to overall management of the water resources of the region.

Benefits

The Deep Tunnel Plan will eliminate waterway pollution by combined sewer discharge, alleviate flood damage, and produce electric power. The return from electric power will serve to reduce the net cost of the project. By concentrating construction underground, the use of this alternative will avoid extensive disruptions to street traffic that would be required in alternative plans.

The Plan will serve as the equivalent of separation of combined sewers while also eliminating pollution caused by separate urban storm sewers. The cost of separation of combined sewers in the Chicagoland area would be in the order of three billion dollars while the net cost of the Deep Tunnel Plan will be under one billion dollars.

Ultimate extension of the Deep Tunnel Plan to intercept flows within the sewer systems will allow raising the level of flood protection from five-year damage recurrence to 100-year recurrence, if desired.

A comparison of the objectives which will be achieved through the Deep Tunnel Plan with those of other plans put forward for the Chicagoland area is shown on Exhibit 5.

Schedule of Development

The Deep Tunnel Plan will be constructed in two stages, each with several construction zones. The first stage will encompass the area draining into the Chicago River System and the Calumet River System. The second stage, to the west, will encompass the Des Plaines River system and portions of the Sanitary and Ship Canal and the Cal-Sag Channel. Construction zones will be initiated at one-year.

intervals starting from the Calumet area, as shown on Exhibit 1.

Engineering studies now underway should lead to awarding the first contract in 1969. The timing of these construction zones will be overlapping with each construction zone taking about three years for completion. Operation of the first zone is scheduled for 1972.

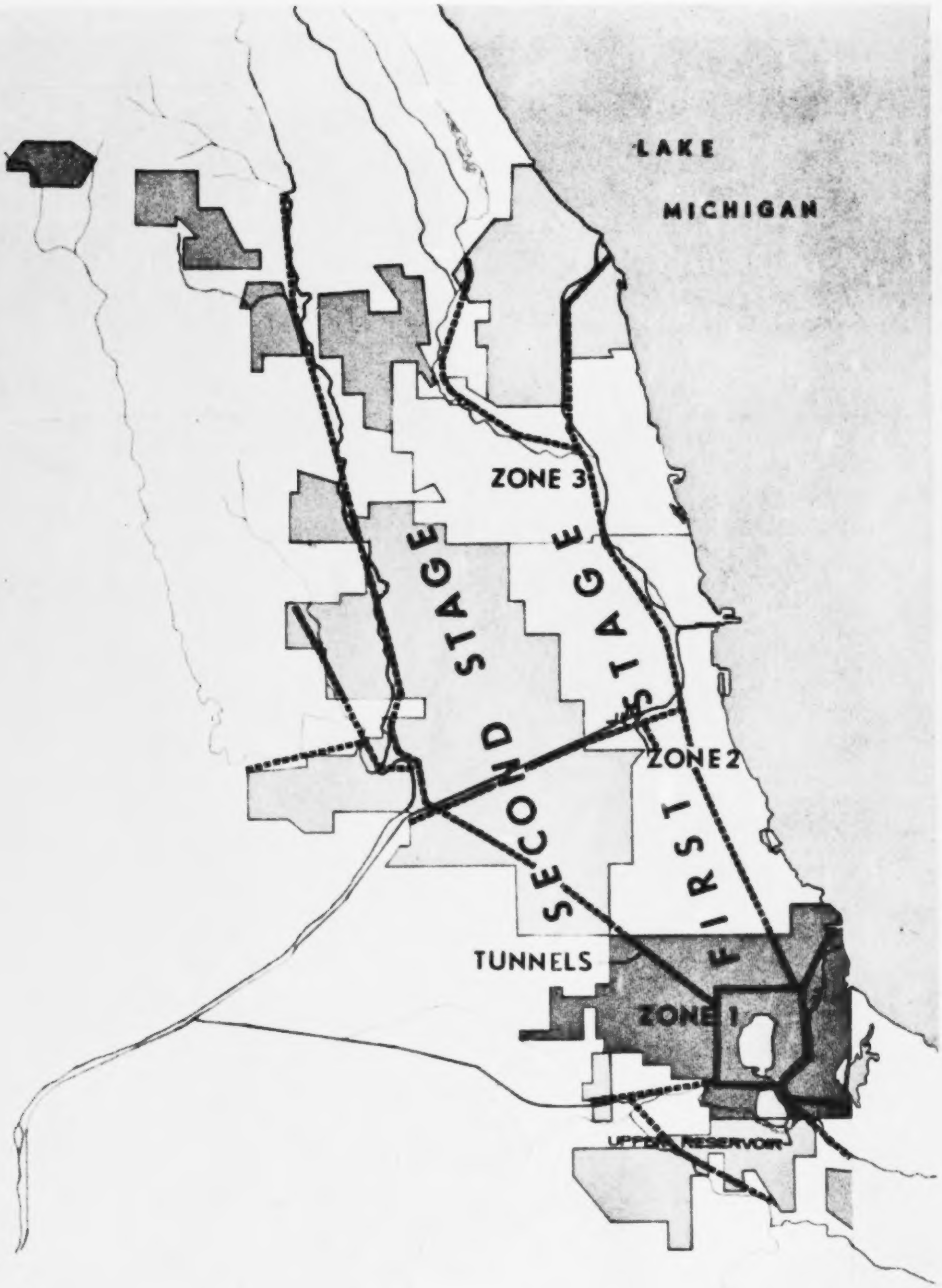
Present Engineering Status

Engineering studies and investigations now underway have two objectives: (1) to develop engineering systems for realizing the concepts of the project and (2) to prepare definite plans for the first construction zone.

The first construction zone has been located in the Lake Calumet area and recommendations have been made for acquisition of land for the upper reservoir and associated wastewater treatment facilities.

Preparations have been made for a program of geologic investigations which will include geophysical soundings, core drilling, and extensive groundwater investigation and testing. Field operations will start in September.

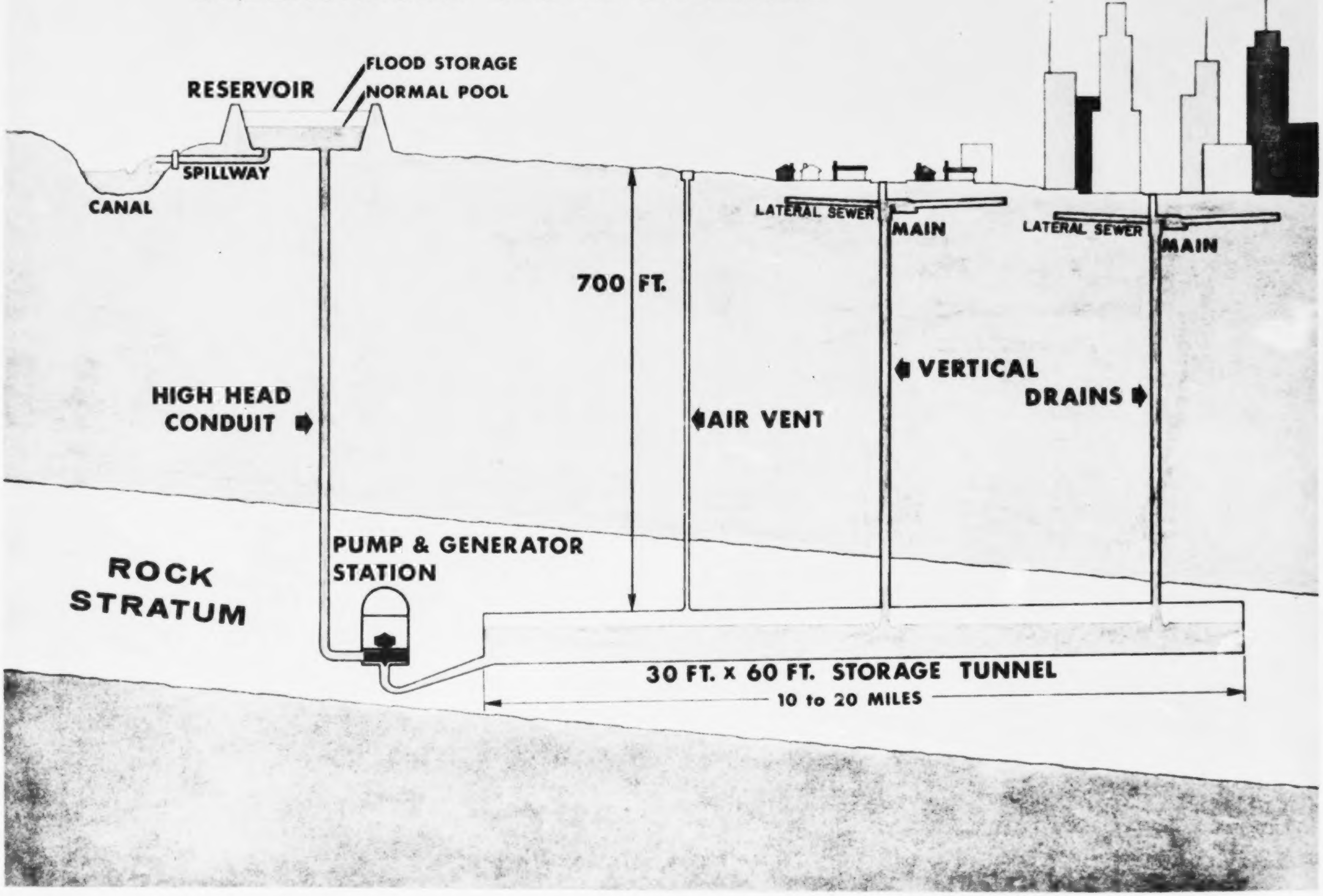
Computer programs have been developed to use methods of systems analysis in sizing project features and for simulating the hydrologic, hydraulic, and bio-chemical operation of the system.

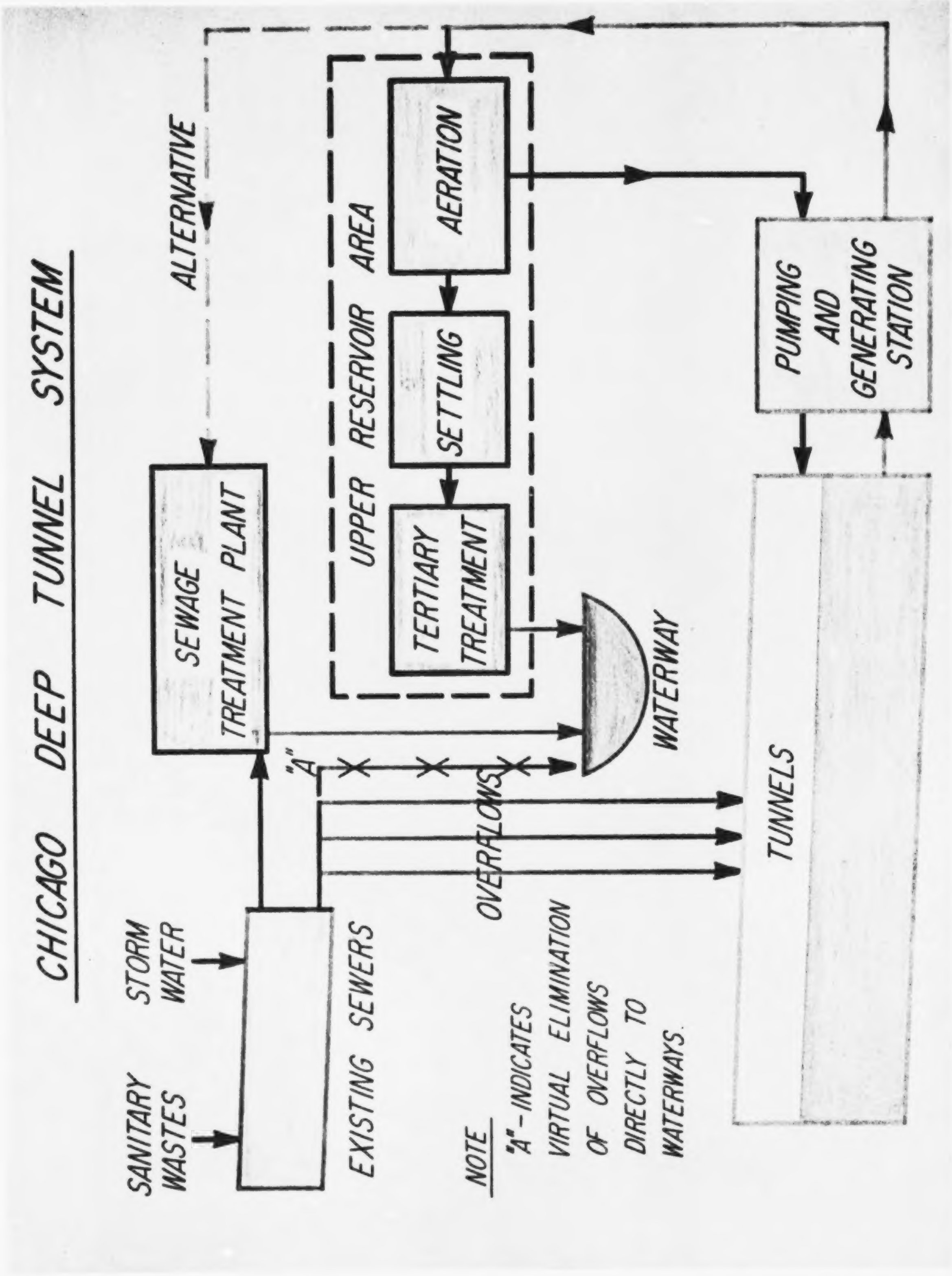


CHICAGOLAND DEEP TUNNEL PLAN FOR FLOOD AND POLLUTION CONTROL

FLOOD RELIEF PROJECT

UNDERGROUND STORM DRAINAGE

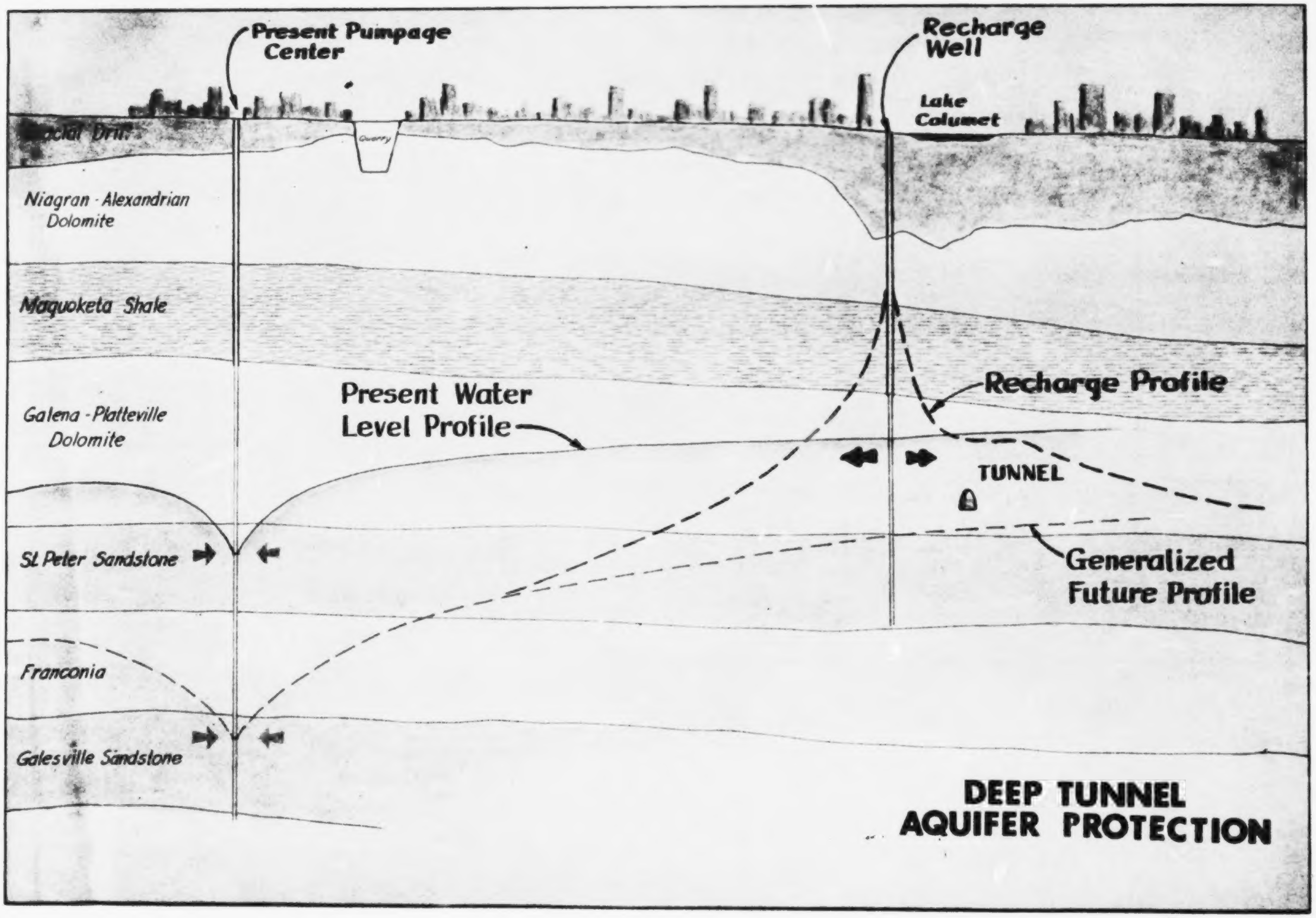




CHICAGO DEEP TUNNEL SYSTEM

NOTE

"A"-INDICATES VIRTUAL ELIMINATION OF OVERFLOWS DIRECTLY TO WATERWAYS.



DEEP TUNNEL AQUIFER PROTECTION

CHICAGOLAND FLOOD CONTROL PLANS COMPARISON

AGENCY	PLAN	DATE OF PUBLICATION	NATURE OF PLAN	ESTIMATED COST IN $ MILLIONS	OBJECTIVES ACHIEVED							
					PROTECT LAKE MICHIGAN	REDUCE CHANNEL FLOOD FLOWS	REDUCE BASEMENT FLOODING	REDUCE POLLUTION FROM OVERFLOWS	IMPROVE DEGREE OF SEWAGE TREATMENT	INCREASE RECREATION USES	PRODUCE ELECTRIC POWER	PROVIDE OTHER BENEFITS
METRO. SAN. DIST.	DEEP TUNNEL	1966	STORAGE & TREATMENT	87 TO 600+	YES	YES	YES	YES	YES	YES	YES	YES
	RESERVOIRS	1964	FLOOD STORAGE	25	SOME	YES	NO	NO	NO	YES	NO	NO
	DES PLAINES R.	1960	LOWER CHANNEL	70	YES	NO	NO	NO	NO	NO	NO	YES
	RAMEY PLAN	1958	BIGGER CHANNELS	100	YES	NO	NO	NO	NO	NO	NO	NO
	MEISSNER PLAN	1958	RESERVOIRS & CHANNELS	200±	YES	NO	NO	NO	NO	YES	NO	NO
CITY OF CHICAGO	AUXILLIARY RELIEF SEWERS	STARTED 1947	MORE SEWERS	300+	NO	NO	YES	NO	NO	NO	NO	NO
	O'HARE RESERVOIR	1959	EXAMPLE OF RUNOFF STORAGE		NC	YES	NO	NO	NO	NO	NO	YES
	CALUMET AREA	1965	SEWERS AND PUMPING STATION	62	SOME	NO	YES	NO	NO	NO	NO	NO
COOK COUNTY	DES PLAINES R.	1959	RESERVOIR	3	NO	YES	NO	NO	NO	YES	NO	YES
	SALT CREEK	1959	RESERVOIR	3	NO	YES	NO	NO	NO	YES	NO	YES
	OTHER STREAMS		RESERVOIR		SOME	YES	NO	NO	NO	YES	NO	YES
STATE OF ILLINOIS	CANAL LOWERING	1966	LOWER CHANNEL	600	YES	NO	NO	NO	NO	NO	NO	NO
	DU PAGE RIVER	1966	RESERVOIR		NO	YES	NO	NO	NO	YES	NO	NO
	DES PLAINES R.	1962	RESERVOIR & CHANNEL	30	NO	NO	NO	NO	NC	YES	NO	NO
	FOX RIVER		RESERVOIR & CHANNEL		NO	YES	NO	NO	NO	YES	NO	NO
	OTHER STREAMS		BIGGER CHANNEL		NO	NO	NO	NO	NO	NO	NO	NO
CORPS OF ENG'RS	CALUMET UNION DITCH	STARTED 1954	BIGGER CHANNELS	2.5	NO	NO	YES	NO	NO	NO	NO	NO
	CAL. SAG. CHANNEL	67% COMPLETE STARTED 1946	NAVIGATION CHANNEL	INCLUDED IN ILL. WATERWAY	YES	NO	NO	NO	NO	NO	NO	NO
	ILLINOIS WATERWAY	95% COMPLETE STARTED 1927	NAVIGATION PROJECT	330	YES	NO	NO	NO	NO	NO	NO	NO
	FOX RIVER	STARTED 1960	STUDY ONLY									
	LITTLE CAL. RIVER	STARTED 1961	STUDY ONLY									
NIPC	WATER STUDY	1966	WATER RESOURCE MANAGEMENT		NO	YES	NO	NO	NO	YES	NO	YES

BAUER ENGINEERING, INC.

J. E. Egan

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
CHICAGO DEEP TUNNEL PLAN
PHASE B - FEASIBILITY STUDIES
SPECIAL PROGRESS REPORT ON
SANITARY ENGINEERING ASPECTS

AUGUST 15, 1967

HARZA ENGINEERING COMPANY
BAUER ENGINEERING, INC.

I. General

On July 6, 1967, and August 7, 1967, meetings were held with the Sanitary Engineering Consultants. The Consultants retained for this study are:

1. Mr. Paul E. Langdon of Greeley and Hansen.
2. Prof. Don E. Bloodgood, Purdue University.
3. Prof. G. A. Rohlich, University of Wisconsin.
4. Mr. Walter A. Lyon, Director of Division of Sanitary Engineering, Pennsylvania State Department of Health.

The various sanitary engineering aspects were discussed, with particular emphasis on the operation of the Deep Tunnel System sewage treatment processes and on solids collection. Although additional detailed studies are needed in certain areas of the system operation, no overly difficult problem areas came to light during these meetings.

The Deep Tunnel System is now being developed on the premise that the system effluent must meet the recently established waterway standards. Although we had formerly considered that treatment would be accomplished at the Calumet Sewage Treatment Works, we have now determined that the Calumet Sewage Treatment Works is not well suited to handle the large volumes of weak sewage to be expected. This is the reason why separate treatment facilities are required.

II. Elements of Deep Tunnel System

The elements of the system as developed thus far are shown on Figure 1. The system is divided into two major sections, the tunnel area and the upper reservoir area.

A. Tunnel

The tunnel area would be separated into two sections. The conveyance section, while providing flood storage capacity, would be used primarily to transport the combined sewage overflows to the tunnel loop sump area. The loop sump would provide an area in which floating and settleable solids would be concentrated and the flow aerated.

Construction of the loop sump area would permit continuous one-direction flow in the tunnel even with the introduction of pumped-storage flow. A plan illustrating how the two tunnel sections would be related is shown on Figure 2.

B. Upper Reservoir Area

The upper reservoir area would also be divided into two basic sections, the aerated lagoon sections and the settling section. Although some settleable solids would be collected in portions of the compartmented aerated lagoon, the primary purpose of this area is to reduce the Biochemical Oxygen Demand to the required level.

The settling section would provide for the necessary suspended solids removal prior to tertiary treatment.

C. Tertiary Treatment and Sludge Removal

Since the Calumet Sewage Treatment Works is located near the reservoir site, it is contemplated that the necessary tertiary treatment and sludge treatment and removal would be coordinated with the Calumet operations.

III. Alternative Operational Procedures

Besides consideration of the basic system function of handling combined sewage overflows, consideration has also

FIGURE 1

DEEP TUNNEL PROJECT FLOW CHART

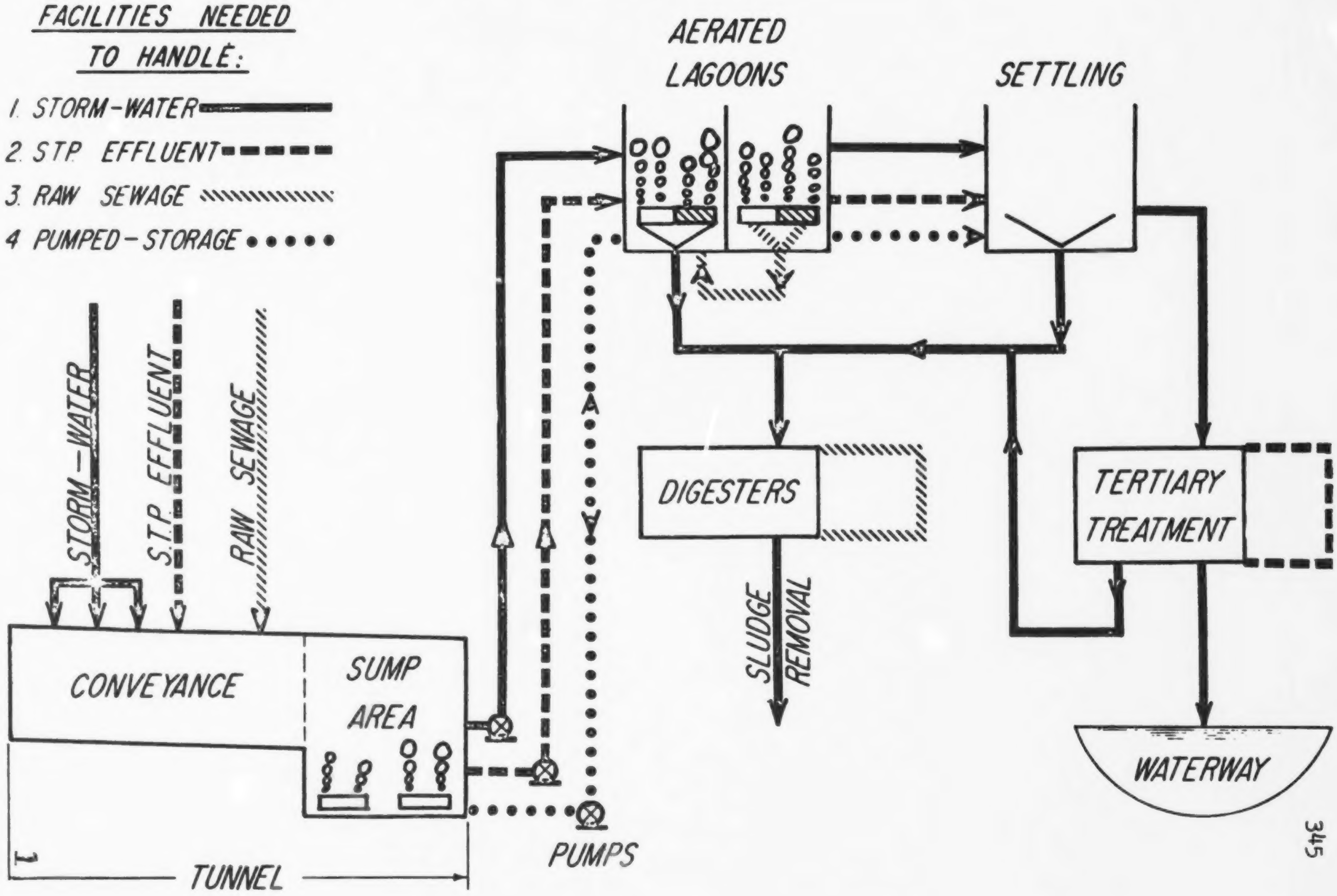
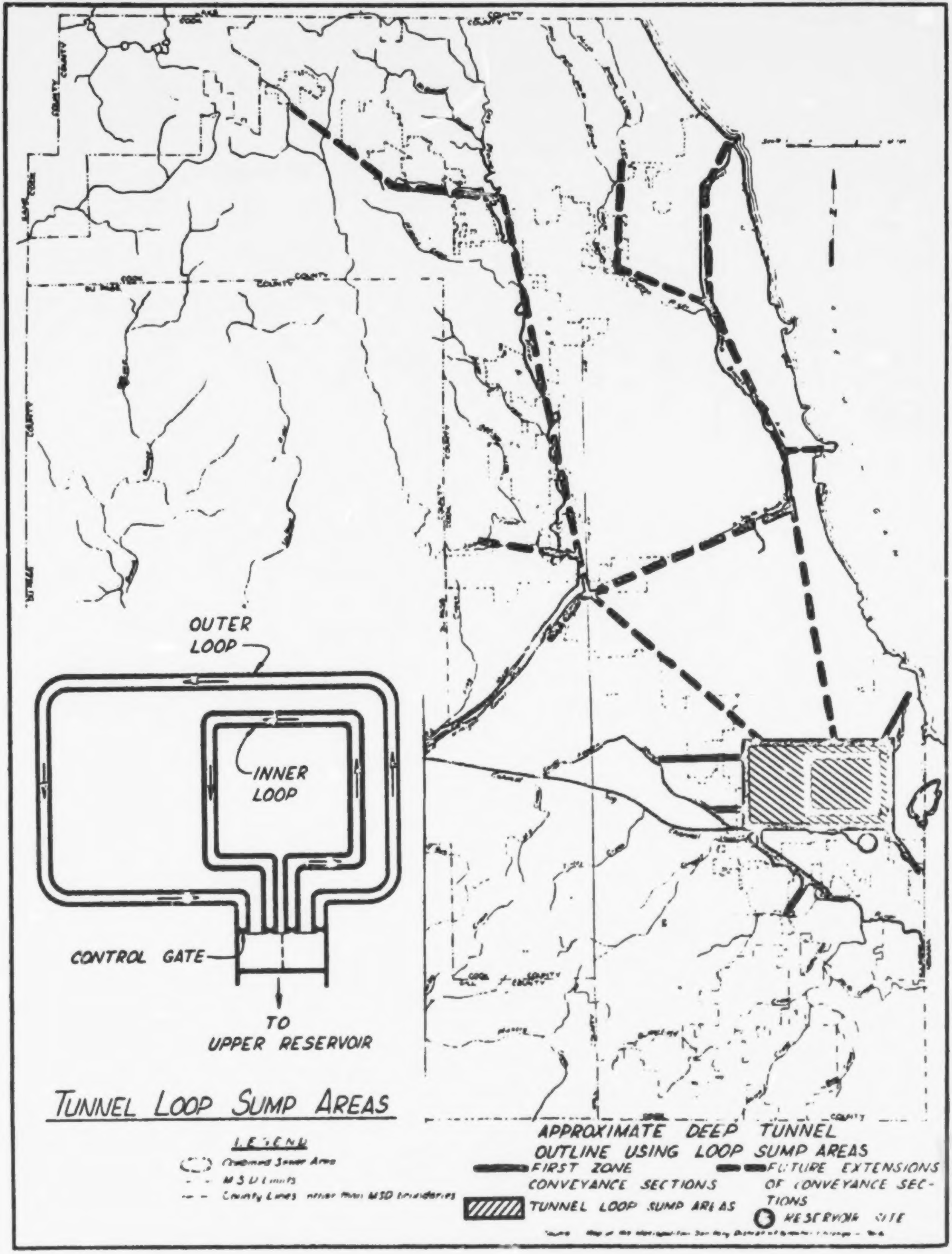


FIGURE 2



APPROXIMATE DEEP TUNNEL OUTLINE USING LOOP SUMP AREAS been given to the operation of the system with secondary sewage treatment plant effluent, raw sewage, and pumped-storage flow. It now appears that the use of pumped-storage flow and the possible introduction of small quantities of raw sewage are the preferable alternatives. The use of secondary sewage treatment plant effluent for flushing and a long-range program of large-scale raw sewage additions to the system are possibilities.

Pumped-storage flow would provide for the dilution of smaller volume, high BOD concentration combined sewage overflows and for the dual use of pumping facilities. The use of pumped-storage flow would probably reduce the general obligation bond capitalization, resulting in a net reduction in cost to the taxpayers.

IV. Possible Solids Handling Procedures

It is contemplated that some trash and floating materials would be excluded from the system because of the inlet structure design.

During system operation, predominately grit-type inorganic solids would be collected in the loop sump area. The remaining solids would be collected in the upper reservoir area and in the tertiary treatment facilities.

V. Mathematical Model Analyses

Computer programs simulating the operation of the Deep Tunnel System components are being developed. These programs would analyze the system during selected critical time periods.

* * *

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Honorable Carl L. Klein, Chairman,
and Members of the
Water Pollution and Water Resources
Commission
Station of Illinois

PROGRESS REPORT ON TEN-YEAR PROGRAM AND FINANCING

Gentlemen:

As mentioned previously, the State Sanitary Water Board through SWB-15, set a 10-year goal which municipalities within the Sanitary District must meet, and which industrial dischargers must match. Basically, the program requires effluent chlorination, removal of visible and settleable solids, tertiary treatment, sewer separation or its equivalent, and no more construction of combined sewers. To implement this program, the Sanitary District on July 27, 1967, adopted a policy on 10-year program and goals which embodies the following timetable:

By 1968, chlorination at all plants, or facilities under construction.

By 1969, solids removal, visible and settleable.

By 1971, tertiary treatment under way.

By 1972, equivalent of sewer separation under way.

This program is actually more advanced in cleanup than required in the State Water Quality Standards, in that the North Side chlorination facility is already one and a half years ahead of schedule, having been put on line in July 1967, the Calumet chlorination facility will be on line over one year ahead of schedule, that is, before the end of 1967, and it is anticipated that chlorination at Stickney will be well in advance by two or three years of the 1972 deadline. The total 10-year program is portrayed in pages 1 through 4. To the year 2000, the total cost will be $1,778,000,000, while the first ten-year cost will be $1,098,000,000. The result of the program will be to maximize the water uses of the inland waterways within a 10-year period, as shown on page 4, permitting all of the uses from waste assimilation at the bottom of the scale to municipal water supply source, at the top of the scale, with fishing and swimming, and other higher uses, along the 71 miles of the inland waterways. Pages 5 through 7 of the attached is a news release on the 10-year program to eliminate pollution of inland waterways, and it is a less detailed description of the program than the foregoing.

The 10-year program must be implemented not only in design, but in financing. The District is required to file with the State Legislature every five years, what is called a "Five-Year Pegged Levy Construction Program". The last one was filed in 1965. It simply sets forth, on a year-by-year basis, what facilities the District intends to construct at the time of the filing of the program, and the best cost estimate that can be made at that time. One of the first steps necessary to get the 10-year program under way is to bring the 5-year pegged levy program ahead just as soon as possible. This is proposed in a letter dated July 27, 1967, from the office of the General Superintendent, to the Board of Trustees (pages 8 through 14). This document simply shows that there must be a vastly accelerated 5-year pegged levy construction program, as presently it is estimated that there will be a disbursement gap of 13.8 million dollars in 1968, as shown on page 10. In bringing the entire 5-year pegged levy construction forward by three years, which is necessary to avail the District of the State and Federal funds, it will be necessary to increase the tempo of the Design program, through the use of outside consultants. It is not possible to multiply by many fold a Design and Construction program, and do it through present or future staff in the present professional market. Accordingly, as shown on pages 15 through 17, the District is utilizing the services of seventeen consulting and surveying firms, for some 26 projects. The major sewer projects that are being brought forward in the accelerated 5-year program are shown in orange on page 14.

Possible financing of the 10-year program, including the flood control aspects, is discussed on pages 18 through 22. The chart on page 22 depicts the 10-year accelerated cleanup program construction expenditures. The analysis and chart show that sufficient funds are available to cover the cost of routine extensions, chlorination, and tertiary treatment. Revenue sources include the current MSD maximum tax levy of $22,500,000, and appropriation of the full authorization of existing Federal and State Grant programs. Under other needed financing, shown at the top of the bar graphs on page 22, a total of $470,000,000 of additional funding is required. It is believed that a substantial portion of these funds can be made available through the

Federal flood control funds for the Deep Tunnel Project, and a substantial portion of the $1,000,000,000 Bond election proposed by the State for 1968 for flood, pollution control, and recreational purposes.

Thus it can be concluded that the 10-year waterways cleanup program is technically feasible, is reasonable in timetable, and very likely, can be financed to a great extent from presently available funds. The chart on page 22 was constructed without showing an increase in the Sanitary District Construction Fund Tax Levy, which yields $22,500,000 per year. It is reasonable to expect that this tax rate will have to be increased, and it is also reasonable to expect that financing through General Obligation Bonds will be necessary for the Deep Tunnel project, in order to rightfully pass some of the costs on to future generations.

Recognizing the need for the maximum in Federal and State aid in order to accomplish the waterways cleanup program, the District has addressed itself to both the State Government and the Federal Government. On pages 23 to 26, under date of February 7, 1967, the District pointed out to the Governor's office the inequities in the former system, whereby the State determined priority for projects for Federal funds. Under the priority system then used by the State, not only the Metropolitan Sanitary District of Greater Chicago, but also other metropolitan areas would receive only a very small portion of the Federal funds made available to the State. The position was taken by the Sanitary District that the Federal funds, and any matching State funds, should be distributed to the Sanitary District generally, in proportion to either population or total taxes paid. Through the sponsorship of this Committee, and through the help of many legislators, the State Sanitary Water Board did agree and adopt a policy that the Metropolitan Sanitary District area should receive 50% of available Federal and State funds. Thus, that portion of the graph shown on page 22, designated as "State and Federal Funds", becomes a much more meaningful and dependable source, and thus the District can prepare better for its future program.

The United States Congress has authorized an appropriation for the current fiscal year in the amount of $450,000,000 for grants for construction of sewerage facilities. In February of 1962, and subsequent thereto also, the Federal Water Pollution Control Administration had asked for approximately $200,000,000. Believing that the full authorization should be appropriated in order for the municipalities to accomplish the needed water pollution abatement, the Sanitary District, on February 20, 1967, addressed a letter (pages 27-28), to Senator Muskie, asking that the full

$450,000,000 authorized for construction grants by the Congress in the Clean Waters Act of 1966, be restored. Many states, municipalities, and districts such as ours have advocated that the full authorized amount be appropriated. To our knowledge, neither your Committee, the State Sanitary Water Board, or the State of Illinois has taken a position on the full Federal appropriation; and we respectfully suggest that this is an issue to which your Committee might well address itself. In the foregoing, I think the Sanitary District has given ample demonstration of its intensive and extensive program for the next 10 years. We are going to need all the financial help we can get, in order to execute the program.

Yours very truly,

/s/ Vinton W. Bacon

General Superintendent

* * *

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611....SUperior 7-8900

July 21, 1967

Members of the
Board of Trustees
Office

POLICY ON TEN-YEAR PROGRAM AND GOALS

J. E. Egan

Gentlemen:

On April 7, 1967, a program was recommended for the clean-up of the six inland waterways and tributaries within the Metropolitan Sanitary District of Greater Chicago. The ten-year program was designed to maximize all water uses in the area, that is, to provide for all uses of water, not just a few. The program of improvement was depicted on a chart showing the ten-year period 1967 to 1977, the water uses to be maximized, and the program for the construction of facilities and processes necessary to upgrade the water. Essentially, the program was:

By 1968, chlorination at all plants, or facilities under construction.

By 1969, solids removal, visible and settleable.

By 1971, tertiary treatment under way.

By 1972, equivalent of sewer separation under way.

This program was prepared after careful discussion among my office and the three departments most concerned, namely, Engineering, Maintenance and Operation, and Research and Development. And if pursued with a sense of urgency, it was believed by all that the program's time schedule is reasonable.

For the District, estimated costs for routine extension of the sewerage facilities and for the accelerated cleanup are compatible with past capital outlays of the District ($601,000,000). Estimated future needs are:

	Ten Years	To Year 2000
Routine extension	$ 303,000,000	$ 713,000,000
Chlorination	15,000,000	15,000,000
Tertiary Treatment	300,000,000	300,000,000
Combined sewer & flood control	480,000,000	750,000,000
	$ 1,098,000,000	$1,778,000,000

Much of the financing can be done with Federal and State funds provided they are equitably distributed.

It was pointed out that the program recommended is compatible with the report and findings of fact of the Special Master for the U. S. Supreme Court in the Lake Diversion case. Subsequent to the letter of April 7, the Supreme Court has issued the decree in the Lake Diversion case, and the recommended program is completely compatible with it.

Rules and Regulations of the Illinois State Sanitary Water Board designated SWB-15, pertaining to water quality criteria of interstate waters in the Chicago River and Calumet River system, as adopted by the Illinois State Sanitary Water Board June 28, 1967, provide in part:

That effluent chlorination facilities shall be provided as follows:

At Lemont - 1968
At Calumet - 1968
At North Side - 1968
At West-Southwest - July, 1972.

That advanced waste treatment (tertiary in our language), may be required at North Side, Calumet, and West Southwest within ten years.

That phosphate removal will be required as soon as practical methods are developed.

That interception and treatment of storm overflow from combined sewers and from pump stations will be required within the next ten years.

That industries will be required to provide a degree of treatment or control equivalent to that required of the municipalities on the same reach of the stream. And that adequate industrial treatment facilities will be required by the end of 1968.

That tertiary treatment providing 98% B.O.D.

reduction, four mg/l B.O.D. in the effluent, five mg/l suspended solids in the effluent for situations where the stream dilution is less than 1 to 1, which will be the situation in the Sanitary District's sewerage system.

Thus, the requirements of the State Sanitary Water Board are essentially the same as those recommended on April 7, although the nomenclature might vary slightly. Accordingly, it is respectfully requested and recommended that the Board of Trustees adopt a policy that the ten-year program for upgrading of inland waterways, as recommended on April 7, and that the ten-year program specified in SWB-17 Rules and Regulations be the program of the Sanitary District for purposes of design, financing, construction, and operation.

Very truly yours,

/s/ Vinton W. Bacon
General Superintendent

cc: Department Heads
Mr. Coyne

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

AUGUST 14, 1967

FOR: IMMEDIATE RELEASE

The Metropolitan Sanitary District of Greater Chicago has embarked on a 10-year program to eliminate pollution in the inland waterways under its jurisdiction.

In vision, the district's goals can be compared to the pace-setting boldness of the turn of the century, when the district reversed the flow of the Chicago River and created the Sanitary and Ship Canal to protect Lake Michigan against pollution.

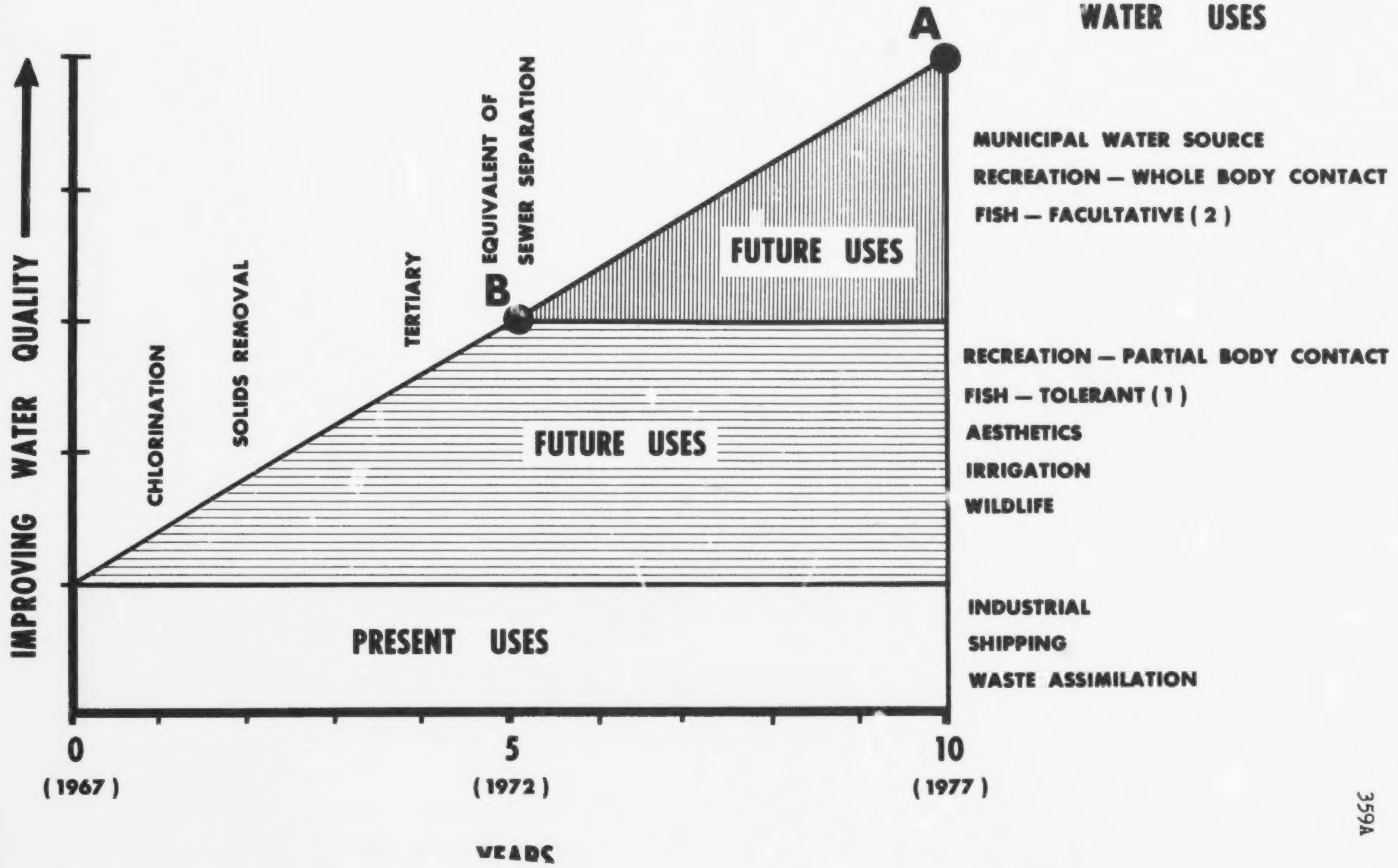
The new plan, introduced by general superintendent Vinton W. Bacon, and endorsed by the Board of Trustees last July 27, is designed to make its inland waterways fit for other uses, such as fish and wildlife habitation, irrigation, recreation (boats), and eventually, to some degree, swimming.

Because of the district's reversal of the Chicago River, carrying effluent away from Lake Michigan, metropolitan Chicago is the only large Great Lakes city with unpolluted swimming facilities and uncontaminated raw water supply.

The district's timetable calls for chlorination at all plants, or facilities under construction, by 1968; removal of visible and settleable solids by 1969; tertiary

GRAPHIC UPGRADING OF INLAND WATERWAYS

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO



treatment under way by 1971; and the equivalent of combined sewer separation by 1972.

The estimated cost for this program is $1,098,000,000, much of which is expected to be offset by Federal and State funds.

The district currently spends $22,000,000 a year on construction of pollution abatement works. Bacon said annual construction outlays will rise to $100,000,000. Much of the design plans will have to be prepared by outside consulting engineers because the district's engineering department is not geared to handle such a load.

The district has approved contracts with four consulting engineering firms for preparation of studies, plans and specifications to expand and build water reclamation plants for the northwest portion of Cook County.

The firm of Brown and Caldwell of San Francisco will design a 45.5 mgd (million gallons per day) plant, estimated to cost $14,000,000 to serve parts of the communities of Des Plaines, Elk Grove Village, Mt. Prospect, Arlington Heights and Wheeling. Connecting sewers are expected to cost about $16,859,000.

Camp, Dresser and McKee, of Boston, will design a plant of 29 mgd initial capacity to serve parts of Palatine, Rolling Meadows, and Elk Grove Village. The estimated cost of the plant is $10,200,000, and the estimated cost of the sewers is $8,350,000. The district retained Harza Engineering Co. to aid in locating 2,780 acres of land for the water reclamation plants and for utilization of the solids.

The Chicago firm of Greeley and Hansen will design and draw specifications to construct Battery D aeration tanks and to expand and rehabilitate sections of the West-Southwest Treatment Works. The $20,000,000 expansion is needed to meet the increasing waste load and provide maximum hydraulic capacity of two times the average dry weather flow.

-0-

for additional information:

Vinton W. Bacon

100 East Erie

Chicago, Ill. 60611

SU 7-9404

8/14/67

* * *

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

100 EAST ERIE ST., CHICAGO, ILLINOIS 60611 ... SUperior 7-8900

July 27, 1967

Members of the
  Board of Trustees
Office

ACCELERATED 5-YEAR PEGGED LEVY CONSTRUCTION PROGRAM

Gentlemen:

Attached is a study made by the Engineering Department, showing the impact of estimated Federal and State funds for 1968 and 1969, on our construction program. This study shows that unless the pace of our construction program increases, a potential gap in construction disbursements of 13.8 million dollars will occur in 1968. By way of introduction, this information was furnished to you yesterday in the President's office.

The highlights of this study are as follows:

1. An estimated 42.8 million dollars will be available for disbursement during 1968.
2. Our present construction program (even though it has been somewhat accelerated by the insertion of several new contracts) will disburse an estimated 29 million dollars during 1968.
3. Therefore, we estimate a disbursement gap of 13.8 million dollars in 1968. Our present program is obviously not sufficient to make full use of available funds.
4. The last three pages of the attached report outline a program to eliminate this potential deficit. In preparing this program, we have included all projects

which were contained in the Report in Support of 1965 Legislative Program, (called the 5-Year Pegged Levy Program), along with other projects. We have identified those projects which will be designed by our engineering staff and indicated, with estimates, those projects which must be performed with outside engineering services.

In summary, this report clearly shows that our first step in implementing the ten-year program for the clean-up of the six inland waterways and tributaries, (which was adopted as a Policy of the Board today), must be to immediately accelerate our design and construction program. We recommend bringing the entire five-year pegged levy program forward by three years to avail the District of Federal and State funds and to prepare for the larger components of the ten-year program. This acceleration is compatible with our previous recommendations and the ten-year program specified in SWB-15 Rules and Regulations of the State Sanitary Water Board as submitted to the Federal Water Pollution Control Administration.

This recommendation will be formally submitted to the Board at its next regular meeting on September 7, 1967, or possibly at any special meetings held in the interim, for policy decision on change of program.

J. E. Egan

Very truly yours,

/s/ Vinton W. Bacon

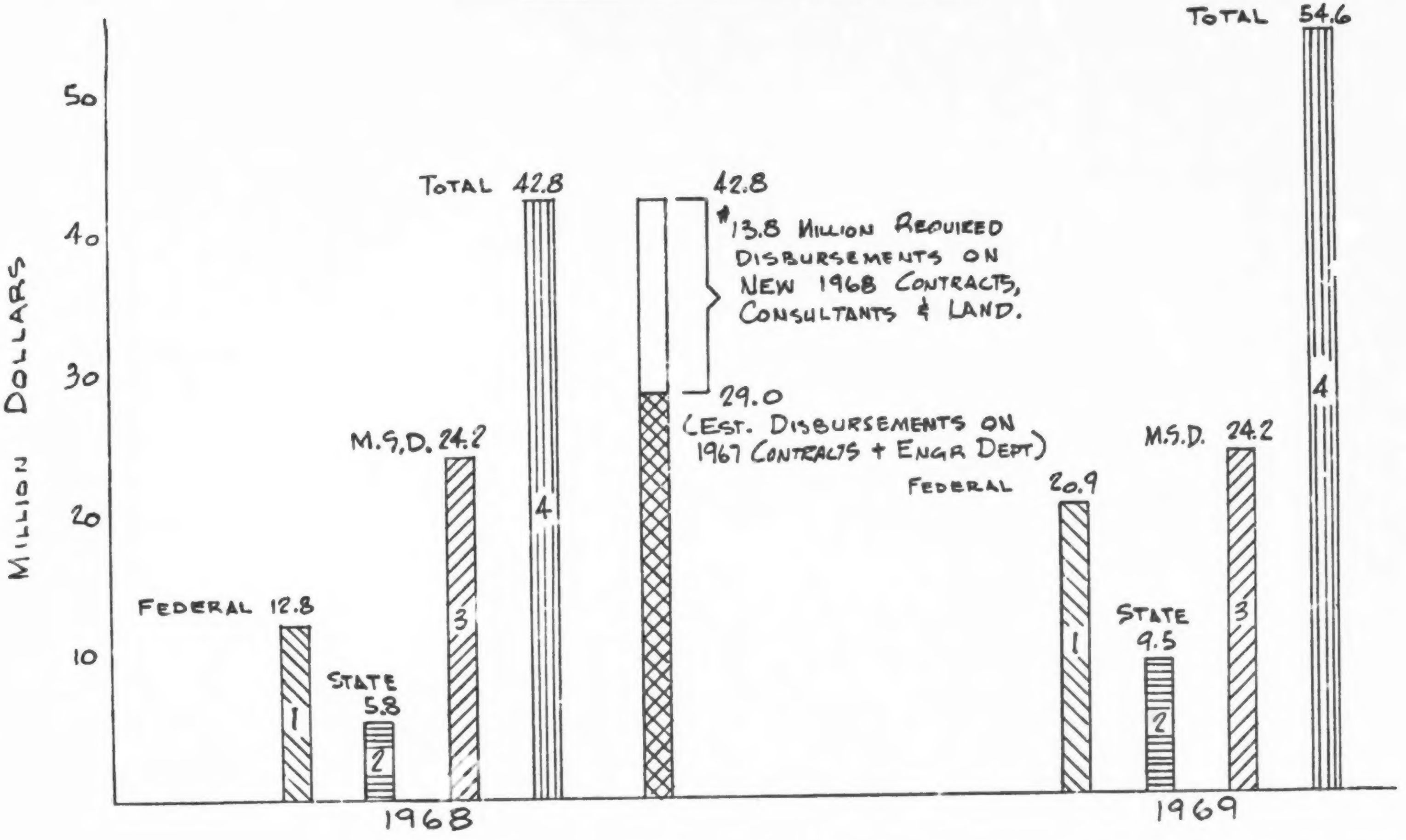
General Superintendent

attachment

cc: Department Heads

PROJE CONTROL
7-21-67
LR.D J.V.V

ESTIMATED CONSTRUCTION FUNDS AVAILABLE 1968-1969



1 ESTIMATED GRANT FUNDS RECEIVED (ASSUMED FULL APPROPRIATION IN 1968-1969)
2 ESTIMATED STATE MATCHING FUNDS AT 25% (RETROACTIVE TO 1967)
3 SANITARY DISTRICT FULL APPROPRIATION LEVY 75% OF $27 MILLION = $20.2
BACK TAXES 3.0
CARRY OVER 1.0
$24.2

4 TOTAL (1+2+3)

Project Control
7-25-67
LRD JVV

ACCELERATED CONSTRUCTION FUND PROGRAM FOR 1968

(INCLUDES 5 YEAR PROGRAM PROJECTS)

PROJECTS	EST. CONSTR COST	1968 ESTIMATED DISBURSEMENTS		
		STUDIES	DESIGNS	CONSTR.
Calumet Plant				
Scum Incinerator	$ 300,000	-----	-----	$300,000
Hydraulic Study for Conduits		$ 50,000		
Final Tanks A & B	915,000	-----	$ 36,000	-----
Study Whole Calumet Area and Plant Requirement (G & H)		100,000		
Replace 440V Breakers and Transformers	750,000	-----	in house	150,000
Rehabilitate Electric for Batteries A & B	100,000	-----	in house	-----
Replace M.G. Sets Pump and Blower House	300,000	-----	15,000	-----
West-Southwest Plant				
Additional Final Tanks Battery B Aeration and Final Tanks Battery D	20,000,000	-----	700,000	-----
440V and 6600V Switchgear	750,000	in progress	40,000	-----
Air Pollution	4,000,000	-----	160,000	-----
Replace Blowers (G & H Report)	1,500,000	in house	in house	-----
New Vacuum Pump	125,000	-----	in house	-----
Revise Aerated Grit Chambers	100,000	-----	in house	100,000
North Side Plant				
Replace Outdoor Substation	750,000	-----	Consultant Dec. 1967 Award	500,000
Pumping Station, Screens, Preliminary and Grit Chambers (G&H Report)	6,600,000	75,000	396,000	-----
Electrical Work	100,000	-----	in house	50,000
Additional Plants				
Salt Creek Plant (30 M.G.D.)	15,000,000	100,000	500,000	-----
O'Hare Plant (45 M.G.D.)	23,000,000	100,000	750,000	-----
Poplar Creek Plant (5 M.G.D.)	2,500,000	in progress	100,000	-----
Small Plants and Pumping Stations				
Hanover Addition	500,000	-----	in house	500,000
North Branch Pumping Station (Additional Pumps) G & H	1,900,000			
Subtotal, Page 1	$79,190,000	$425,000	$2,697,000	$1,600,000

367

Project Control
7-25-67
LRD JVV

ACCELERATED CONSTRUCTION FUND
PROGRAM FOR 1968
(INCLUDES 5 YEAR PROGRAM PROJECTS)

PROJECTS	EST. CONSTR. COST	1968 ESTIMATED DISBURSEMENTS		
		STUDIES	DESIGNS	CONSTR.
Small Plants and Pumping Stations				
Interceptor East of North Branch Pumping Station to Glenwood and Broadway Sewer	$ 7,000,000			
Telemeter Unmanned Pumping Station	100,000	-----	in house	-----
95th Street Pumping Station Replace Breakers and Transformer	125,000	-----	in house	-----
Sewers				
Calumet				
Contract 17F Repair or Replace	2,500,000			
Contract 17G	1,400,000	-----	in house	900,000
Contract 17H	3,100,000	-----	93,000	250,000
Contract 18F Extension B	500,000	-----	in house	300,000
Contract 18F Extension C	350,000	-----	in house	250,000
Contract 19F	2,100,000	-----	in house	500,000
(Changed from 19E Extension B)				
Contract 19F Extension A	3,100,000			
Contract 19H	1,700,000	-----	51,000	-----
Relief		50,000		
Controls	100,000	-----	in house	-----
Crawford Avenue Relief	9,000,000			
Northwest				
Contract 4	6,300,000	-----	in house	1,800,000
Contract 5	6,000,000	-----	in house	-----
O'Hare Plant North West 13	4,400,000	-----	134,000	-----
O'Hare Plant North West 15	3,000,000	-----	90,000	-----
O'Hare Plant North West 15A	500,000	-----	20,000	-----
Upper Salt Creek North West 17	4,400,000	-----	134,000	-----
Poplar Creek Interceptor	3,500,000	-----	144,000	-----
Howard				
Howard Interceptor Relief (Golf-Glenview #3 and #4)		50,000		-----
Southwest				
Controls and Connections	250,000	-----	in house	-----
Relief Sewer	6,000,000	75,000	120,000	50,000
Contract 13A	6,000,000	-----	in progress	1,000,000
Contract 17C Extension A	55,000	-----	in house	55,000
Subtotal, Page 2	$71,480,000	$175,000	$786,000	$5,105,000

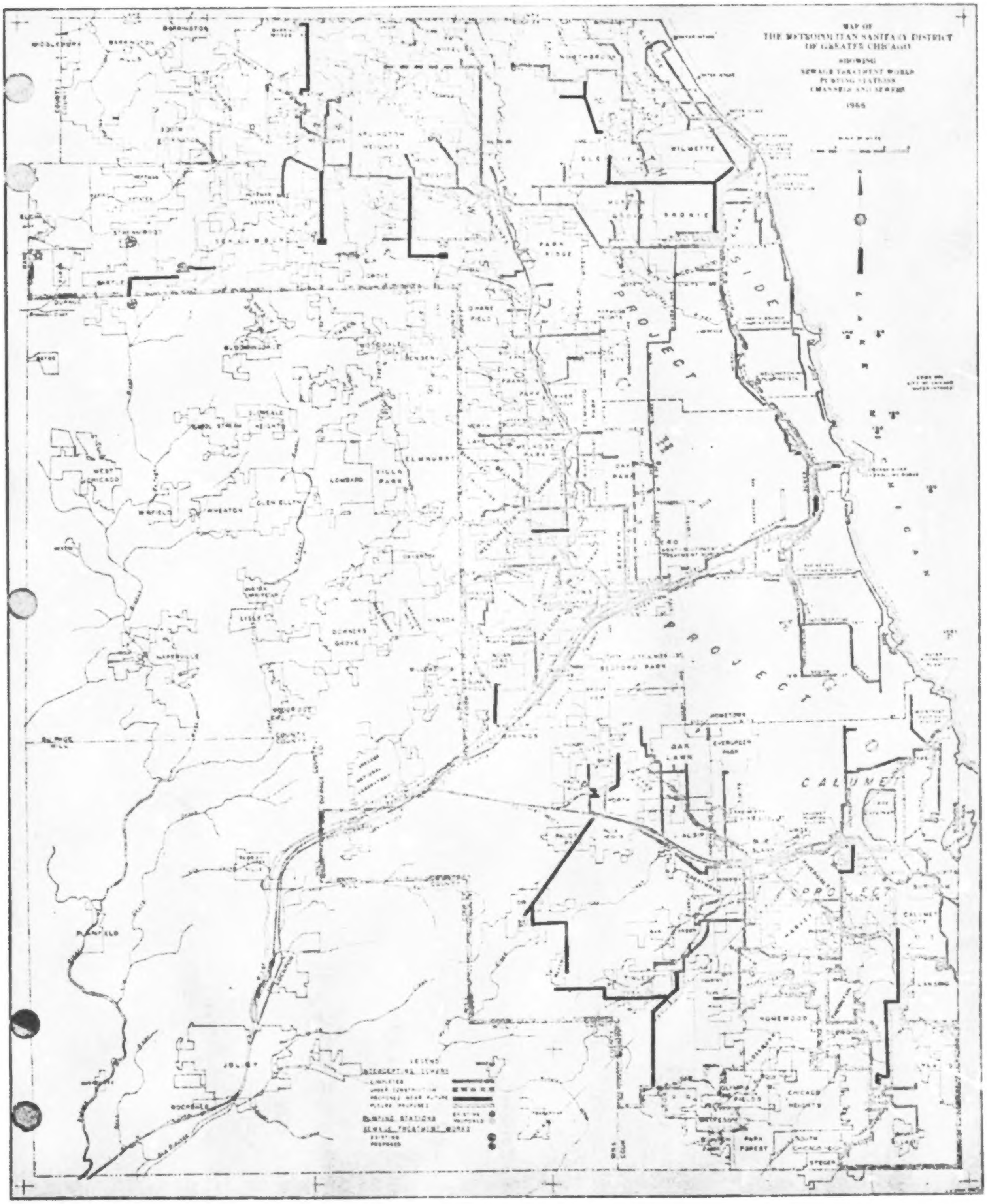
Project Control
7-25-67
LRD JVV

ACCELERATED CONSTRUCTION FUND
PROGRAM FOR 1968

(INCLUDES 5 YEAR PROGRAM PROJECTS)

PROJECTS	EST. CONSTR. COST	1968 ESTIMATED DISBURSEMENTS		
		STUDIES	DESIGNS	CONSTR.
Des Plaines				
Contract 11D Extension F	500,000	-----	20,000	-----
Contract 11E (Palatine)	1,100,000	-----	35,000	-----
Contract 11H Extension A	660,000	-----	in house	660,000
Controls	100,000	-----	in house	-----
Other				
Borings Deep Tunnel	400,000	-----	-----	400,000
Land Purchase	-----	-----	-----	1,897,000
Subtotal, Page 3	$2,760,000	-----	$55,000	$2,957,000
Total	$153,430,000	$600,000	$3,538,000	$9,662,000

Total Estimated New 1968 Program Disbursements	$13,800,000
Estimated 1968 Disbursements on 1967 Construction Contracts and 1968 Engineering Department Costs	29,000,000
Total Estimated 1968 Construction Fund Disbursement	$42,800,000


MAP OF
THE METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
SHOWING
SEWAGE TREATMENT WORKS
PUMPING STATIONS
CHANNELS AND SEWERS
1966
LEGEND
INTERCEPTING SEWERS
COMPLETED
UNDER CONSTRUCTION
PROPOSED NEAR FUTURE
FUTURE PROPOSED
PUMPING STATIONS
EXISTING
PROPOSED
SEWAGE TREATMENT WORKS
EXISTING
PROPOSED
LAKE MICHIGAN
NORTH SIDE PROJECT
WEST SIDE PROJECT
SOUTHWEST PROJECT
CALUMET PROJECT
BARRINGTON
ARLINGTON HEIGHTS
NORTHBROOK
WILMETTE
SKOKIE
PARK RIDGE
O'HARE FIELD
ELMHURST
LOMBARD
VILLA PARK
GLEN ELLYN
WHEATON
WINFIELD
WEST CHICAGO
NAPERVILLE
LISLE
DOWNERS GROVE
BEDFORD PARK
OAK LAWN
EVERGREEN PARK
ALSIP
HOMEWOOD
CHICAGO HEIGHTS
PARK FOREST
SOUTH CHICAGO HEIGHTS
STEGER
LANSING
CALUMET CITY
JOLIET
PLAINFIELD
LOCKPORT

CONSULTANT	PROJECT	EST. COST OF PROJECT	AREA SERVED BY PROJECT
Bauer Engineering Co., Inc.	Hydraulic Studies for Aerated Grit Chamber	$ 100,000	West-Southwest
Bauer Engineering Co., Inc.	Professional Hydraulic Analysis of the Present and Proposed Preliminary Settling Tanks - Div. AEb	1,700,000	West-Southwest
Brown & Caldwell	Design Report on O'Hare Water Reclamation Plant	23,000,000	O'Hare Watershed Basin
Camp, Dresser & McKee	Design Report on Salt Creek Water Reclamation Plant	15,000,000	Salt Creek Watershed Basin
Consoer, Townsend & Assoc.	Preparation of Contract Plans, Specs, Estimates and Calculations - Lemont Sew. Trt. Wks.		Lemont
Consoer, Townsend & Assoc.	Preparation and Furnishing Contract Plans, Documents for Calumet Int. Sewer - Cont. 19G, Ext. C&D	4,300,000	Matteson, Hazel Crest, Country Club Hills
Westenhoff & Novick, Inc.	Test Borings for above contract.		
Consoer, Townsend & Assoc.	Prepare and Furnish Plans & Documents Const. Cal. Int. Sew. - Cont. 18H, Ext. A & B	5,200,000	Orland Park and Palos Park
Westenhoff & Novick, Inc.	Test Borings for above contract		
DeLeuw - Cather & Co.	Prepare and Furnish Plans & Documents - Const. S.W.I.S. Contract 13A	6,800,000	LaGrange, Lyons, McCook, Brookfield
Chicago Aerial Survey	Aerial Photography for Cont. 13A		
Soil Testing Service, Inc.	Soil Borings & Investigations for Contract 13A (Above)		

MAR

CONSULTANT	PROJECT	EST. COST OF PROJECT	AREA SERVED BY PROJECT
University of Illinois - Bursar	Services of U of I - Study of Agriculture Benefits and Environment Changes Resulting from Use of Digested Sewage Sludge on Field Crops	600,000	Entire Sanitary District
Hemeon Associates	Studies, Analysis and Recommendation of System and Equipment for Control of Contaminants in Waste Gases That are Discharged from Stacks Sludge Disposal Plant - W.S.W.S.T. Wks.	16,000 (Study Only)	West Area of Chicago, Cicero, Berwyn, Stickney
Greeley & Hansen	Prepare Contract Plans, Specs, Estimates and Calculations - Division AC, Batt. D	20,000,000	Chicago and West Suburbs
Greeley & Hansen	Study of Poplar Creek Area for Proposed Water Reclamation Plt. and Intercepting Sewer	10,000,000	Poplar Creek Watershed Area
Greeley & Hansen	Study of Effects of Extending Present Boundaries of MSDC	No est. cost. Study only	
Harza Engineering Co., & Bauer Engineering Co., Inc.	Study Stage Feasibility - Deep Tunnel Plan		Entire Sanitary District
Harza Engineering Co.	Prepare Route & Site with Estimated Costs of Facilities, Engineering Costs of Design, Plans, Specs and All Phases of Project, including Transportation & Land Disposal of Sludge	23,000,000	
Mauchly Associates, Inc.	Consulting Services - To Develop Program Plan - Phase III		Entire Sanitary District

MAR

CONSULTANT	PROJECT	EST. COST OF PROJECT	AREA SERVED BY PROJECT
National Engineering Co.	One (1) Simpson Porto Muller - 60-day Rental Plus Services of Two (2) Men to Supervise Test. - W.S.W.S.T. Wks.	Pd. in Full 12/9/66	W.S.W.S.T. Wks.
Pioneer Service & Engr. Co.	Review of Specs - Contract 66-11	314,069	Cook County Area
Harza Engineering Co.	To Supply Design & Model Testing Services for a Chlorine Mixing Chamber - Cont 65-41	1,844,000	Entire Calumet Tributary Area
Terrametrics, Inc.	Provide Information Relative to Loads and Internal Stresses, Resulting from Excavation of Tunnel Thru Deposits of Glacial Till - Cont. 3C, NWIS (Not related to Specific Job)	Research Work for Design of Tunnel Sections	
Polytechnics, Inc.	Eleven (11) Man Days Engineering Services to Determine Release of Particular Gases from Stack #3 of Sludge Disposal Plant - W.S.W.S.T. Wks.		W.S.W.S.T. Wks.
Wesenhoff & Novick, Inc.	Borings, Contract 17G - Calumet I.S.		Calumet City

MAR
8/24/67

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 21, 1967

Honorable John E. Egan, President,

and

Members of the Board of Trustees

Office

FINANCING TEN-YEAR PROGRAM,
INCLUDING FLOOD CONTROL ASPECTS

Gentlemen:

We have a continuing study of not only the sequence of construction within the ten-year program, but also possible methods of financing.

On the subject of financing, I am enclosing a copy of a report dated August 18, 1967, from DiVita to Mickle, under the general title of "Funding of Ten-Year Accelerated Clean-up Program". This deals primarily with the possibility of Federal funds for the flood control aspect. Please note particularly paragraphs 1 and 2, and the chart which shows that we estimate that approximately half of the funds would be available from current sources, without increasing the District's construction pegged levy.

I have started meeting with both State and Federal representatives regarding the availability of flood control funds.

Sincerely yours,

Vinton W. Bacon

General Superintendent

cc w/att:

Department Heads

Mr. Coyne

Harza Engineering

Bauer Engineering

* * *

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

ENGINEERING DEPARTMENT

DATE: August 29, 1967

OFFICE MEMORANDUM

TO: C. T. Mickle, Chief Engineer

FROM: L. DiVita, Engineer of Project Control

SUBJECT: Funding of Ten Year Accelerated Cleanup Program

Attached is a graphical illustration of the financial requirements of our ten year cleanup program. This analysis shows that sufficient funds are available to cover the cost of routine extensions, chlorination and tertiary treatment. Revenue sources included maximum MSD tax levies and full authorizations of existing Federal and State sewage treatment plant grant programs. The total portion of our billion dollar clean-up program that requires additional funding is approximately $470,000,000.

I've looked into the availability of Federal and State financial assistance for flood control purposes. Two agencies, the Corps of Engineers and the State Water Resources Board, are both committed to financially support and construct flood control and multipurpose water resource works. I recommend we take immediate steps to establish our deep tunnel project in the programs of both these agencies. My reasons for this recommendation are as follows:

1. Project fits the three basic categories of civil works the Corps is authorized to construct.

A. Flood Control - Corps is responsible for providing flood control protection through civil works improvements. Moreover, in the past the State has acted as local sponsor of many flood control projects constructed by the Corps in Illinois.

B. Recreation - In 1965 Congress passed an Act urging the Corps to support multipurpose water resource development. This Act provides for picking up 50% of project costs allocated to recreation. I am certain final plans for the deep tunnel project will provide areas for water related recreation.

C. Navigation - Because of the high velocities during flood stages, navigation on our waterways is curtailed about 3% of the year. The deep tunnel plan will eliminate this problem.

2. In terms of public benefits the project has solid economic justification.

A. From the figures I've reviewed on past flood damages in the metropolitan area, I am certain this project is justified on a cost-benefit basis. The Corps usually requires a favorable cost-benefit ratio before they will report a recommendation for a project.

B. Flood water storage in the metropolitan area will also provide benefits and protection to downstream communities.

C. An alternate plan for flood control in the area (deepening, widening, etc.) developed by Meissner Engineers for MSD is estimated at $300,000,000 (1958 prices.)

3. Corps annual appropriations are large and it is not unusual for them to take on big projects.

A. In 1966 the Corps spent $1,360,000,000. In that year, $375,000,000 was for flood control projects and $323,000,000 for multipurpose projects. The $70,000,000 per year we need for the deep tunnel project represents only 5% of their total annual budget.

B. A State of Illinois study states the Corps has projects valued at $95,000,000 either under construction or proposed along the lower Illinois River basin. Yet, virtually no flood control projects have been done or considered in our area by the Corps.

C. The Corps does take on single large projects. A review of their 1965 authorizations shows they are currently working on three flood control projects having respective values of $181,000,000, $218,000,000 and $227,000,000.

4. Local participation can be provided by the State of Illinois.

A. The proposed $1,000,000,000 State Water Plan has earmarked $100,000,000 for flood control purposes. Only $30,000,000 is earmarked for actual projects. It is stated in the Water Plan report that $70,000,000 remaining is to enable the State to participate as local sponsors in Federal flood control projects.

B. The proposed $1,000,000,000 State Water Plan has earmarked $250,000,000 to finance programs for water related recreation facilities. They point particularly to developing these facilities near metropolitan areas.

C. If the 50% allocation of Federal sewage plant grants is extended to flood control and water related recreation projects, it will mean $150,000,000 can be allocated to Cook County.

In conclusion, I believe existing Corps of Engineers and State of Illinois programs are geared for undertaking financial support of a project such as our Deep Tunnel Plan. Since the project will provide benefits for the bulk of the States population (62% in metropolitan Chicago), I feel we should be able to gain the support of the city, county and State governments.

/s/ Leo R. DiVita

Engineer of Project Control

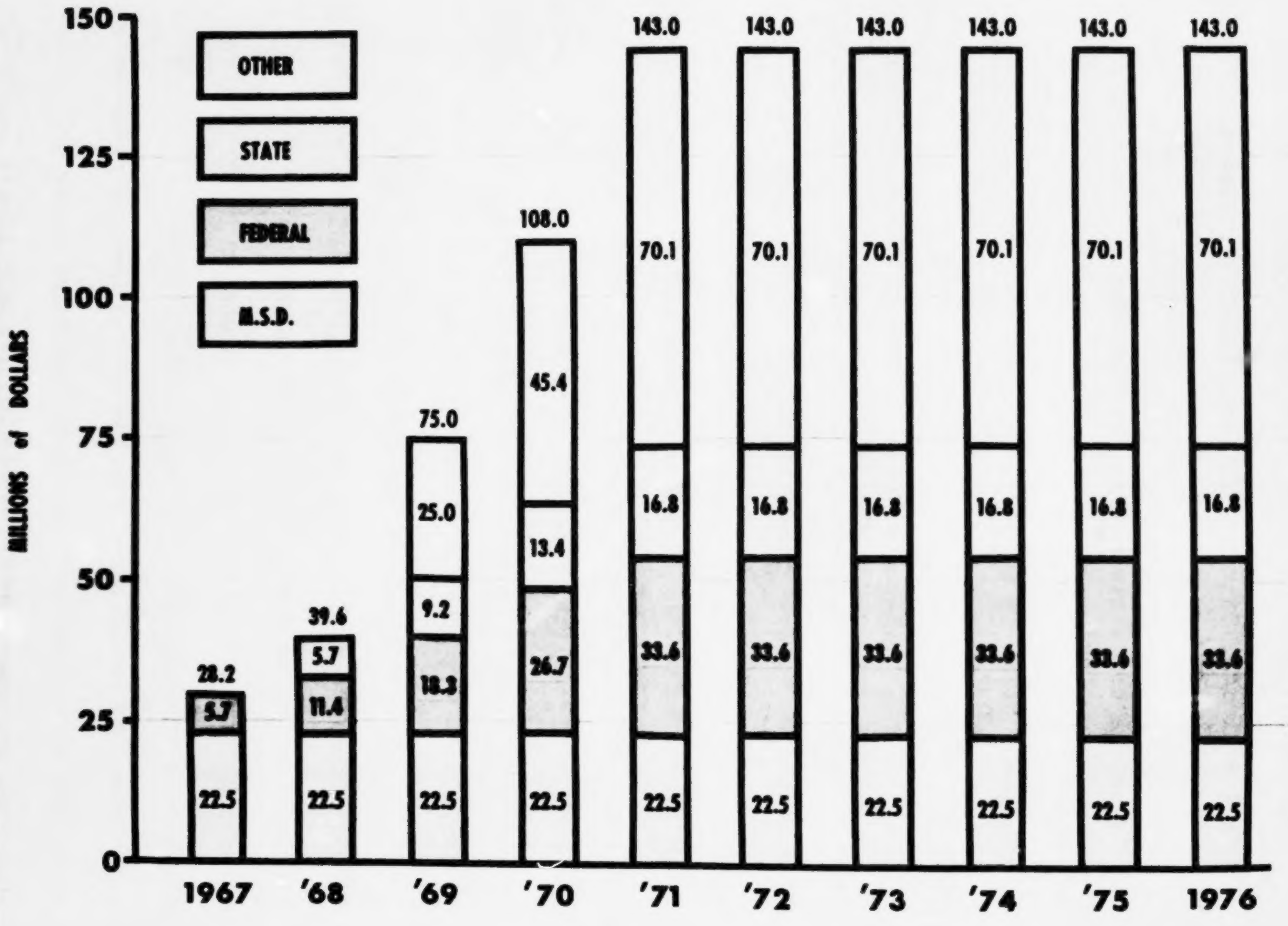
LRD:lb

Attach. (3)

cc: Braxton

File

10 - YEAR ACCELERATED CLEAN - UP PROGRAM CONSTRUCTION EXPENDITURES



NOTE: FULL FEDERAL & STATE AUTHORIZATION ASSUMED

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

February 7, 1967

Mr. Robert Maher, Assistant to the Governor
207 State House
Springfield, Illinois 62706

Dear Mr. Maher:

In our recent meeting in Springfield, President John E. Egan and I spoke to you about how we have been excluded from receiving Federal funds allocated to the State of Illinois because of the inequity of the State Sanitary Water Board's present priority rating system. As we see it, unless the State Sanitary Water Board's present priority system is changed, municipalities such as ours will continue to be passed over in the State's allocation of Federal funds. I was asked to explain to you how the system works against us.

For example, in the 1966-1967 fiscal year the formula Congress established in the anti-pollution legislation (Public Law 660 as amended) required two-thirds of the authorization to be distributed to the states in direct proportion to the population of each state. Congress intent was clear; the chief beneficiaries of the grant program were to be the more populous urban municipalities whose pollution abatement programs benefit a proportionately larger number of people. Yet in the State Sanitary Water Board's initial priority list for fiscal year 1966-1967 not one of the 15 bona fide applications submitted by the Metropolitan Sanitary District was sufficiently high in priority to qualify for a grant award. This in spite of the fact that the District serves over 5,000,000 people in Cook County, or 50% of the population of our State. In fact our analysis of the State Sanitary Water Board's priority listing of projects that fell within the State of Illinois' allocation shows (1) that only 5% of the State's population would receive benefit from Federal funds; (2) one percent of the population will receive 50% of all the money allocated to our State. The average amount of aid given to those communities awarded grants was $33 per capita, whereas the District's highest priority application which sought aid of only 35 cents per capita received little consideration. This performance clearly shows that their priority system does not properly reflect the population formula set up by the Congress.

Getting down to the priority system criteria themselves, the following illustrations are examples of how their system works against us and other multiple-cities such as ours. I will refer to the priority criteria scoring sheet (Exhibit No. 1) from time to time.

1. The system provides maximum benefits to

communities who are doing the poorest job in combating pollution. Items A-1 and A-2 of Exhibit 1, which represent 19% of the total point scoring system, actually gives the maximum number of points to communities that have not carried out any effective programs for preventing or controlling pollution. As can be seen on Exhibit 1, the highest scores go to the communities where pollution complaints have been filed and the degree of pollution is serious. In other words, those communities which have the least to solve their own pollution problems received the highest scores. Whereas the municipalities such as ours, where the community has made sacrifices to keep pollution down to a less hazardous level, are receiving lower scores. However, in our case, we discharge sewage treatment plant effluent to our canals that has an equivalent of raw sewage from a population of over 800,000. Communities downstream from us consistently raised objections - nevertheless, we are able to keep this discharge down to the point where we do not jeopardize the health and safety of our neighbors. Certainly a priority system that rewards those who are lax is an incentive in the wrong direction, and is a penalty for communities that have made efforts to control pollution.

2. The State Sanitary Water Board priority system penalizes those communities that are on a sound "pay-as-you-go" funding system for financing their capital improvements. In Part II, Subsection B (Construction Cost) of Exhibit 1, the most points are given to projects that have the highest cost per capita. The maximum of nine points, or 21%, of the total score is involved.

Most communities finance the construction of sewage treatment plants and intercepting sewer systems by floating bond issues on an intermittent basis. These issues normally have a life of 20 to 50 years. Now when these communities submit their grant applications for facilities they intend to finance with a 20 to 50 year bond issue, the State Sanitary Water Board computes the cost per capita by using the total project cost, and divides by using the community's population: in effect this gives you a figure reflecting the total cost to the community over the 20 to 50 year bond period, rather than the average yearly cost per capita.

At the District we construct and finance our improvements from annual tax collections or a "pay-as-you-go" system. When we submit our applications, the total project cost is divided by our population, and yields a per capita construction cost on a yearly basis. The effect is quite obvious. The per capita construction cost figure for communities financing with bonds has 20 to 50 times leverage over the Metropolitan Sanitary District in scoring, since we finance our construction on an annual tax collection basis. The figures from the 1966 applications clearly illustrate this point. The successful 1966 grant applications by communities who finance their projects with long-term bond issues average per capita construction costs of $117.00 per community for projects having value of $20.8 million. For our District, which finances on a yearly basis, the per capita construction cost computed by the State Sanitary Water Board for an application that received their highest priority rating was $2.91. This project had a value of $7.4 million. As a result, other communities received an average of 7.4 priority points whereas the District received 0.2 points. From this explanation, I feel you can agree that the present priority system clearly works against us.

There are several other examples we can point to regarding the inequity of the priority system, but we feel we would be belaboring our case. I feel the case has been plainly established. If the Metropolitan Sanitary District is to keep pace with the demands for improving water quality standards we must have Federal support. To this end, we seek your assistance in righting the present State Sanitary Water Board priority system.

Very truly yours,

/s/ Vinton W. Bacon

General Superintendent

Att: 1

cc: Honorable John C. Kluczynski (Wash. & Chgo.)

Edward Pinzak, Administrative Assistant

Klassen - State San. Water Board

President and Trustees - Metro. Sanitary District

Department Heads

Seaman

Poston - Fed. Water Control Pollution Admin.

Schneider - Fed. Water Control Pollution Admin.

Exhibit No. 1

ILLINOIS SANITARY WATER BOARD CRITERIA

I. Water Pollution Control

A. Necessity	Points:
1. Pollution Category	
a. Pollution exists - complaints filed	4
b. Poor quality or no treatment	3
c. Potential pollution	2
d. Local nuisance	1
2. Degree of Pollution	
a. Extremely serious	4
b. Serious	3
c. Moderate	2
d. Light	1
3. Primary Use of Stream	
a. Domestic Water Supply	4
b. Residential, Fish & Wildlife, Agricultural, Recreational	3
c. Industrial, policy, compact	2
d. Other	1
B. Abatement Progress	
1. Voluntary	3
2. Satisfactory	2
3. Poor	1
C. Prevention Progress	
1. Excellent	3
2. Satisfactory	2
3. Poor	1

II. Financial Need (Midpoint figures)

A. Assessed Valuation $/Cap.	Points	B. Construction Cost $/Cap.
500	9	180
1000	8	160
1500	7	140
2000	6	120
2500	5	100
3000	4	80
3500	3	60
4000	2	40
4500	1	20

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

100 East Erie St., Chicago, Illinois 60611 ...SUperior 7-8900

February 20, 1967

The Honorable Edmund S. Muskie
The United States Senate
Washington, D. C.

Dear Sir:

Recently I read an article stating it was your belief that the Federal Water Pollution Control Administration has underestimated the pollution control needs of the Nation. We couldn't agree with you more. We thought that with the passage of the Clean Waters Act of 1966, Congress was seriously concerned with combating pollution, and had established effective legislation and funding to deal with it. Yet, a few months later, the FWPCA announced that funds for construction grants are not needed. This is not the case in metropolitan Chicago.

Due to lack of funds in the Federal Construction Grant Program, we have been able to make only slight progress on our backlog of needed sewage treatment facilities. In fact, we are hard pressed to keep pace with the growth in our area.

From our experience during the past two years, we can convincingly show how the lack of funds in the

Construction Grant Program seriously affected us. Briefly, our two year background of applications for sewage treatment work Construction Grants can be summarized as follows:

YEAR	NO. OF GRANT APPLICATIONS SUBMITTED	TOTAL VALUE OF PROJECTS	TOTAL FEDERAL GRANT REQUESTED	GRANT AWARDS TO DATE
1965	12	$22,896,000	$ 6,850,000	$1,145,000
1966	15	33,721,500	10,107,400	____
TOTAL	27	$56,617,500	$16,957,400	$1,145,000

Needless to say, if these worthy projects would have been funded by the Federal Government's Construction Grant Program, our pollution abatement schedule would have been that much further along.

These applications represented bona fide projects, approved by our State agency. In fact, one of the applications not funded was for a full-scale truly tertiary treatment plant addition at one of our outlying plants -- the first of its size and kind in the United States. Nevertheless, our State agency tells us it could not fund our projects because there are insufficient Federal grant appropriations to Illinois.

In the light of our experience, we must take exception to the FWPCA's position that Construction Grant Funds are not needed.

Through our Capital Improvement Program, we are making every effort to combat pollution. However, we know we need Federal support to do the job. To this end, we ask your assistance in restoring the full $450 million authorized for Construction Grants by the Congress in the Clean Waters Act of 1966.

Very truly yours,

/s/ Vinton W. Bacon

General Superintendent

cc: Congressmen Blatnik, Dirksen, Kluczynski, Percy

Messrs. DiLuzio, Klassen, Leland, Maher, Poston, Quigley, Schneider, Yoder

SD Board of Trustees

Department Heads

Messrs. Braxton, DiVita, Seaman

* * *

STATUS REPORT
OF
INDUSTRIES DISCHARGING TO MSD WATERWAYS
IN THE CALUMET REGION

STATUS REPORT OF INDUSTRIES DISCHARGI ; TO M WATERWAYS
TABLE 1

Page 1 of 2

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED	PRESENT STATUS
Bulk Terminals 12200 So. Stony Island Ave. Chicago, Illinois	Calumet	Oil Chemical and Domestic	40,000	Oil Separation	All corrections to b completed by the er of 1968
Catalin Corporation 142nd St. & Paxton Avenue Calumet City, Illinois	Cal. River	Chemical	1,700,000	Chemical Treatment	Recommended Boar Order to comply by Dec. 4, 1967. All Process waste to Sanitary Sewer
Ford Motor Company 12600 So. Torrence Avenue Chicago, Illinois	Calumet River	Oil Alkalinity Solids	500,000	Oil Separation Settling and Neutralization	Company installed waste treatment facilities which wer found inadequate. The are presently intending to remove all process waste f river drains.
Interlake Steel Company 135th St. & Perry Avenue Riverdale, Illinois	Calumet River	Oil, Acids Solids Phenols Cyanide	48,000,000	Neutralization Oil Separation Settling, etc.	Detailed plans will completed Nov. 1, 1967. Construction facilities complete June 1, 1968
Republic Steel Company 117th & Burley Avenue Chicago, Illinois	Calumet River	Oil, Acids Solids Phenols, Cyanide	85,000,000	Neutralization Oil Separation Settling, etc.	Now that standards have been set they are proceeding witl final engineering plans.

STATUS REPORT OF INDUSTRIES DISCHARGI TO M WATERWAYS

TABLE 1

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED	PRESENT STATUS
Robertson Transformer 136th & Thornton Road Blue Island, Illinois	Calumet River	Chemical	100	Chemical Treatment	Under surveillance by MSD - Chemical: are moved by scavenger
Spencer Chemical 142nd & Paxton Calumet City, Illinois	Calumet River	Chemical	1,500,000	Chemical Treatment	All corrections to b completed by end of 1968
United States Steel Company 3426 E. 89th Street Chicago, Illinois	Calumet Riv. and Cal. Harbor	Oil, Acids Solids Phenols Cyanides	457,800,000	Neutralization Oil Separation Settling, etc.	Now that standards have been set, they are proceeding with final engineering plans. No date set.
Valley Mould 108th & Calumet River Chicago, Illinois	Calumet River	Solids	5,000	Settling	All Process waste i being diverted to San. Sewer - Completion set for Sept., 1967.
Wisconsin Steel Company 106th & Torrence Chicago, Illinois	Calumet Riv.	Oil, Acids Solids, Phenols, Cyanide	70,000,000	Oil Separation Neutralization Settling, etc.	Separating cooling waters from indust: wastes preliminary engineer plans .complete - No date on final plans.

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Honorable Carl L. Klein, Chairman
and Members of the
Water Pollution and Water Resources
Commission
State of Illinois

Gentlemen:

Attached are:

1. "INFORMATION AND DATA PERTAINING TO INDUSTRIAL AND DOMESTIC WASTES", Dated June 21, 1967, Pages 1 Through 58

In addition to listing the domestic discharges, this report, on pages 25 through 40, lists the ninety-nine industrial discharges that are direct to the 3 rivers, the 3 channels, and Lake Michigan. This is the complete inventory of the industrial discharges, and it will be noted that many of the discharges are simply cooling water. On page 25, the total daily discharge of 3,186,366,000 gallons is shown by the quantities to the various waterways. It should be emphasized that the inventory list does not purport to indicate the degree of pollution, or the seriousness of any problems through the quantity of discharge through the individual industries.

Municipal discharges are summarized on page 8. It will be noted that the principal discharges come from the Sanitary District's three large plants and eight small plants. The discharges from the 51 privately owned and operated sewage treatment works within the District are inventoried on pages 11 through 21.

2. LIST OF TEN MOST CRITICAL DISCHARGES TO SEWERS AND STREAMS (pages 59-63)

On pages 60 to 61 is the list of what the District considers the ten most critical dischargers to our sewers on a pound-loading basis. The load to the sewers is important, as it can cause a degradation in the quality of the effluent if it becomes too large.

Pages 62 and 63 list the ten most critical dischargers to the waterways, again on the basis of pound-loading.

3. SUMMARY LISTS OF SHOW CAUSE HEARINGS FROM 1965 TO PRESENT (Pages 64 to 70)

Pages 65 through 68 list the twenty-eight dischargers which have been cited into Show Cause hearings because they are in violation of the 1962 Industrial Waste Ordinance, as to what can be put into the District's sewerage system. It will be noted that thirteen of the companies have already installed facilities that have been approved by the Sanitary District, and that 3 of the companies have installed facilities which are presently being evaluated by the Sanitary District.

On pages 69 and 70 are listed the thirteen dischargers which were cited into Show Cause hearings because the effluents were in violation of the 1946 ordinance, and because substantial progress toward correction was not being made at the time. Five have already eliminated the pollution,in most cases by connecting to the sewerage system.

4. LISTS OF INDUSTRIES IN COMPLIANCE WITH SEWER AND STREAM ORDINANCES (Pages 71 Through 78 Inclusive)

Investigations and chemical surveys have been made of innumerable industries that discharge either to the sewer or to the streams. Pages 72 through 76 show that there are 104 industries in compliance with the sewer ordinance of 1962, and pages 77 and 78 show that there are 35 industries in compliance with the Stream Pollution Control Ordinance of 1946. At this point it should be emphasized that although there are many industries that are in violation of the Pollution Control ordinances, that most of them are on very active programs and tight schedules to comply. The monthly progress reports of the Industrial Waste Section give great detail of this activity, and such reports can be made available to the Committee, if it desires.

5. LIST OF INDUSTRIES DISCHARGING COOLING WATERS TO WATERWAYS (Pages 79 to 83)

These pages list the 33 dischargers of record, who discharge cooling water to the waterways within the boundaries of the Sanitary District. Generally, in our area as yet, cooling water has not been classed as a pollutant. But the new Water Quality Standards for the waterways imposes a temperature limitation which is getting close to being exceeded during certain seasons of the year. Undoubtedly, the waterways cannot receive much more cooling water without exceeding the limit, and certainly, any single large discharger would cause the limits to be exceeded in certain areas at the present time.

6. WATER QUALITY CRITERIA - RULES AND REGULATIONS - SWB-15 ILLINOIS SANITARY WATER BOARD (Pages 84 to 100)

In essence, for all municipal-type discharges, this regulation requires chlorination, tertiary treatment, and either sewer separation or its equivalent, all within ten years. It requires that industrial effluent be of a quality equal to that of municipal effluents. The Sanitary District Board has not set criteria equal to or higher than those of SWB-15.

7. COMPLIANCE SCHEDULE FOR INDUSTRIES (Pages 101 Through 107)

This compliance schedule simply sets forth a timetable for industry to follow in its in-plant housekeeping, debris removal, spill control, sewer separation, neutralization of acid and alkaline wastes, monitoring, degree of treatment, removal of floating and settleable materials, control of toxic materials, and other treatment necessary in order for the industries to comply and dovetail with the SWB-15, and the ten-year program adopted by the Sanitary District.

8. RESOLUTION OF THE BOARD OF TRUSTEES OF THE SANITARY DISTRICT REGARDING ENFORCEMENT (Page 108)

This Resolution of the Board of Trustees, adopted on June 28, 1967, simply states that the Sanitary District assumes the responsibility for the enforcement of water quality criteria pertaining to both domestic and industrial wastes, as such criteria were adopted by the State Sanitary Water Board in SWB-15.

Very truly yours,

/s/ Vinton W. Bacon
General Superintendent

encl: 8

* * *

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

INFORMATION AND DATA PERTAINING TO INDUSTRIAL AND DOMESTIC WASTES

Joseph L. Minkin, P. E.
Research and Control Department
Waterways Research Section

Chicago, Illinois
June 21, 1967

* * * *

TABLE OF CONTENTS

	Pages
Figure I - MSD Chart showing River and Canal System	1
Description of the Metropolitan Sanitary District of Greater Chicago	2-4
MSD Waste Discharge Inventory	5
Appendix 1 - Summary of Municipal Discharges	6
Appendices 2 and 2a - Municipal Treatment Plant Discharges	7-8

Page

Appendix 3 - Summary of Discharges of Privately Owned Treatment Plants 9-19

Appendices 4 and 4a - Pumping Stations 20-21

Figure II - Chart location of Pumping Stations 22

Appendix 5 - Summary of Industrial Discharges 23

Appendix 6a - North Shore Channel Industrial Discharges 24

Appendices 6b, c, d - Chicago River and Tributaries Industrial Discharges 25-27

Appendix 6e - Lake Michigan Industrial Discharges 28

Appendix 6f - Cal-Sag Channel Industrial Discharges 29

Appendix 6g, h - Calumet River and Tributaries Industrial Discharges 30-31

Appendices 6i, j, k, l - Sanitary and Ship Canal Industrial Discharges 32-35

Appendices 6m, o - Des Plaines River and Tributaries Industrial Discharges 36-38

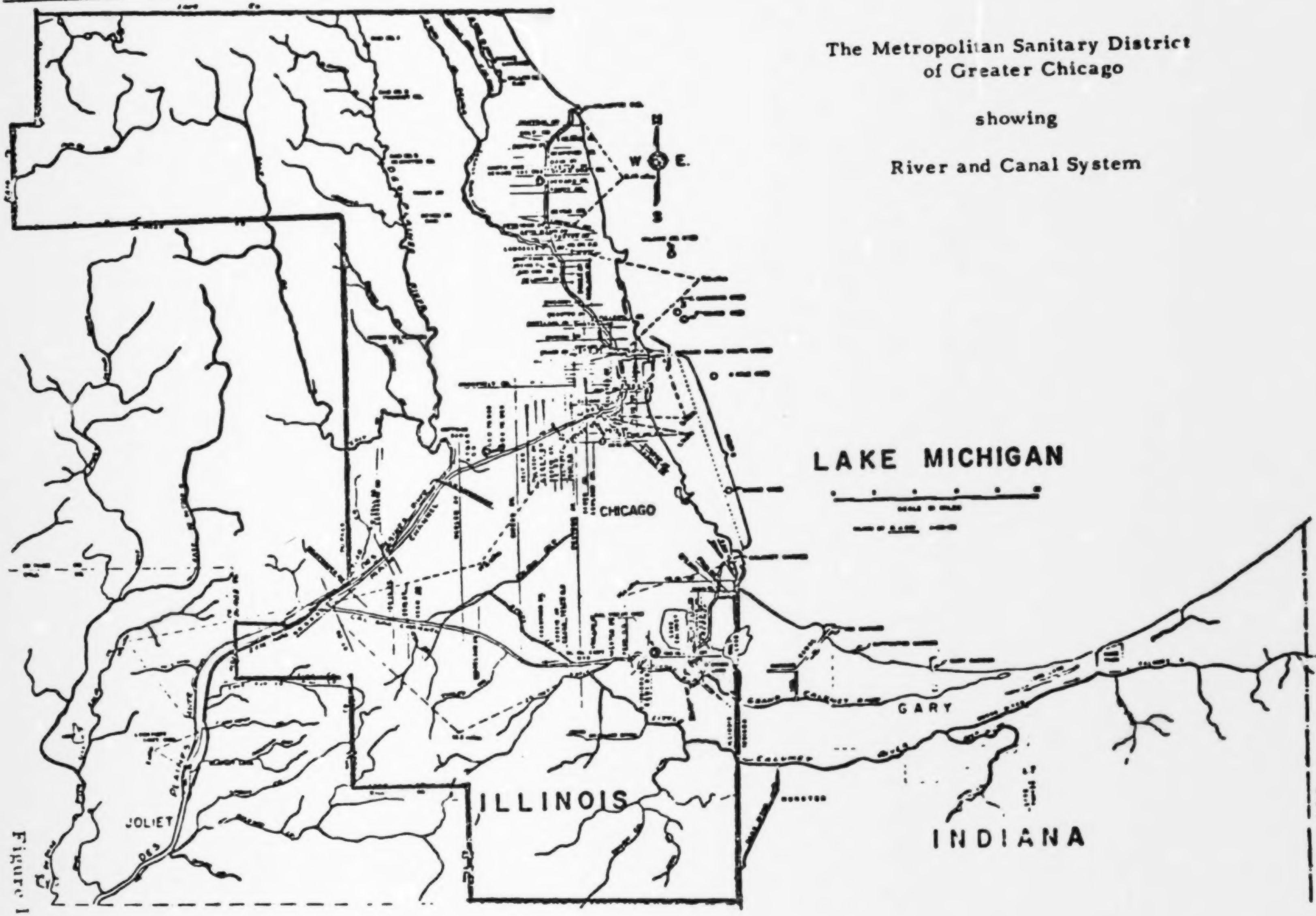
Appendices 7 to 7L - Summary of Chemical and Bacteriological Data showing Parameters measures at Sampling Stations 39-50

Appendices 8 to 8c - Sampling station locations and designations 51-53

Figure III - Chart of Water Quality Sampling Stations 54

Location of Automatic Monitoring Stations 55

Figure IV - Charts of Electronic Water Quality Monitoring Stations 56



The Metropolitan Sanitary District
of Greater Chicago

showing

River and Canal System

Figure 1

J. E. Egan

DESCRIPTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

Area Served

The Metropolitan Sanitary District of Greater Chicago (MSD) legal status and area served: The MSD was organized under the laws of the State of Illinois in 1889. It provided for sanitation control of the Des Plaines River and Illinois River in the Cook County area. The original act has been amended and now the District is within Cook County. The area covered is 858 square miles. The District up to the present has responsibilities concerned with flood control, navigation, sewage and liquid waste collection, treatment and disposal.

The major activities of the MSD are directed to prevent pollution of Lake Michigan, the Illinois River and waterways within the District. The population served is approximately six million. There are approximately 75 miles of navigable canals and waterways in the system.

The MSD serves over one hundred cities and villages within the county and numerous local sanitary districts. Although the connected population is only approximately six million, the population equivalent of treated waste is over nine million.

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The MSD river and waterway system is primarily a man-made and man-controlled artificial canal system. The main stem has its headwaters from Lake Michigan. Three tributaries from the lake join to form the Sanitary and Ship Canal. This drains the major populated area down to Lockport, which is the control terminus of the system.

The Des Plaines River traverses the western half of the area. It has its headwaters in an agricultural area within the state of Wisconsin and is a natural flowing stream.

Sub-Basins and their uses

Lake Michigan Shore line: This is the eastern edge of the land area of Cook County from the Cook County - Indiana boundary on the south to the Cook County - Lake County boundary on the north. The shore line miles are approximately forty miles, of which nearly thirty are in sand beaches for swimming and other whole body recreational use.

North Shore Channel: This is a control channel from Wilmette Harbor inlet to the junction with the North Branch of the Chicago River. It is eight miles long and is used primarily for the directed diversion from the lake into the waterways and to carry the effluent from the North Side Sewage Treatment Plant. There is some limited recreation in the channel, and it has a potential for greater recreational uses. It traverses a heavily populated area.

Chicago River and Tributaries: Chicago River tributary has its headwaters in Lake County. This natural stream joins the North Shore Channel after passing through a heavily populated area. It is used to carry wastes from the communities and has some limited recreational use. From the junction with the North Shore Channel it flows down stream for eight miles and then joins the Chicago River. The North Branch of the Chicago River and the Chicago River formerly flowed into Lake Michigan. The locks, elevations, and controlling works at Lockport are controlled so that flow is now always away from Lake Michigan. Flow in the Chicago River and South Branch of the Chicago River have been reversed to flow away from the lake.

The main line tributary from Lake Michigan is the Chicago River which enters the system from the lake at Chicago lock control works. The flow from the lake is only two miles where the Chicago River joins the North Branch and South Branches. These tributaries join and flow downstream southward under the control of Lockport Controlling Works. The South Branch of the Chicago River is two miles long and is from the junction of the Chicago River and North Branch. The constructed Chicago Sanitary and Ship Canal begins at the southern end of the South Branch. This portion of the system is used primarily for waste assimilation, shipping, industrial use, and some limited boating.

The Chicago Sanitary and Ship Canal: This canal was constructed to carry the reversed flow from the South Branch Chicago River from its upstream point at Western Avenue over the topographic divide to Lockport. The canal is approximately 40 miles long. It carries the metropolitan discharges, diversion water, and natural surface runoff to the Lockport Power House, Lock and Controlling Works. The present controlling works are a two mile extension, constructed in 1908, from the original Sanitary and Ship Canal. This waterway is used for waste assimilation, shipping and industrial cooling and process water.

Calumet River System: The Calumet River system consists of the Calumet River, Little Calumet River and the constructed Cal-Sag Channel. This system carries water from Lake Michigan approximately 30 miles to the junction with the Sanitary and Ship Canal. The internal reaches of this system are:

> The Calumet River from the Calumet Harbor to its junction with the Grand Calumet River, a distance of eight miles. These joined rivers become the Little Calumet River, which flows to the junction with the Cal-Sag Channel, a distance of six miles.

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From the junction, the Cal-Sag Channel continues to its junction with the Chicago Sanitary and Ship Canal, a distance of sixteen miles. The Little Calumet River is a tributary to this system at the junction with the Cal-Sag Channel. The Calumet River System is used primarily for waste assimilation, heavy industrial shipping, processing, and cooling water use.

The O'Brien Lock and Dam, located between the tributary to Lake Calumet and the junction with the Grand Calumet River, is the controlling works for the Calumet River System.

* * *

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO WASTE DISCHARGE INVENTORY

The Metropolitan Sanitary District of Greater Chicago (MSD) system of waste collection, treatment, disposal and flood control serves approximately 6,000,000 people. The three large MSD plants serve 5.5 million. Eight small plants serve approximately one-half million. The effluent from these secondary treatment MSD plants is discharged into rivers and waterways, and constitutes nearly 60 percent of the normal flow in the system.

The total daily discharges are approximately 132,000 pounds of BOD per day; or 795,000 P.E.* In addition to the above loads there are ninety-five industries discharging industrial wastes. Their discharges are over 3 billion gallons per day of mixed cooling water, oil, acid, chemical solids, and BOD. The MSD also supervises the operation of sixty privately owned sewage treatment plants. These discharge 1,100 pounds of BOD per day or 6,600 P.E. The ninety-five industrial plants include a combination of primary, secondary, and special treatment plants. The sixty private plants range from septic tanks to third stage treatment plants. Locations and load discharges are on the attached maps.

* Population Equivalent

Appendix No. 1

METROPOLITAN SANITARY DISTRICT PLANTS

SUMMARY OF DISCHARGES

MUNICIPAL

Source	P.E. Discharge 5 Day B.O.D.
LARGE PLANTS	
North Side	110,000
West-Southwest	540,000
Calumet	130,000
Total	780,000
SMALL PLANTS	
1. Barrington Woods	60
2. Bartlett	350
3. East Chicago Heights	1,900
4. Hanover	850
5. Hazelcrest	1,100
6. Lemont	8,300
7. Orland Park	900
8. Streamwood	1,100
Total	14,560
TOTAL LARGE PLANTS	780,000
TOTAL SMALL PLANTS	14,560
GRAND TOTAL P.E. DISCHARGE	794,560

Appendix No. 2

The Metropolitan Sanitary District of Greater Chicago

Municipal Waste Treatment Facilities

Area or Municipality	1960 Population	Treatment	Year Completed	Design Flow MGD	Present Flow MGD	Receiving Stream
Calumet Area	600,000	Secondary Activated Sludge Not Chlorinated 1966	1922	220	160	Calumet River Little Cal. River
North Side Area	1,230,000	Secondary Activated Sludge Not Chlorinated 1966	1928	300	290	No. Shore Channel
West-Southwest Area	2,920,000	Secondary Activated Sludge plus Wet Air Oxidation Not Chlorinated 1966	1939	900	830	Sanitary & Ship Canal

Appendix No. 2a

The Metropolitan Sanitary District of Greater Chicago

Municipal Waste Treatment Facilities

Area or Municipality	1960 Population	Treatment	Year Completed	Design Flow GD	Present Flow MGD	Receiving Stream
Barrington Woods	400	Trickling Filter Plus Chlorination	1960	100,000	0.056	Salt Creek to Des Plaines River
Bartlett	1,700	Trickling Filter Plus Chlorination	1929	210,000	0.280	Ditch to West Branch Du Page River to Des Plaines River
E. Chicago Heights	13,800	Trickling Filter Plus Chlorination	1962	1,200,000	1.700	Deer Creek to Calumet River
Hanover	13,780	Activated Sludge Plus Chlorination and Polishing Ponds	1963	2,000,000	1.370	West Branch of Du Page River to Des Plaines River
Hazel-Crest	9,600	Activated Sludge Plus Chlorination	1954	1,000,000	0.940	Union Ditch to Little Calumet River
Lemont	4,500	Trickling Filter Plus Chlorination	1961	660,000	0.560	Sanitary and Ship Canal
Orland Park	4,800	Trickling Filter Plus Chlorination	1960	800,000	0.570	Ditch to McGinnis Sloug then to Cal-Sag Channel
Streamwood	11,500	Trickling Filter Plus Chlorination	1959	1,200,000	0.960	Poplar Creek to Fox River

Appendix No. 3

Summary of Discharges

Privately Owned Treatment Plants

Sub Basin Source	P. E.* Discharge 5-Day BOD
North Shore Channel	None
North Branch Chicago River	310
Chicago River	None
Lake Michigan	None
Cal-Sag	1,522
Calumet River and Tributaries	1,030
Sanitary and Ship Canal	2,532
Des Plaines River and Tributaries	1,259
Total P. E. Discharge	6,653

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* Population Equivalent

APPENDIX NO. 3a

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

CAL-SAG CHANNEL

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Westgate Country Club, Palos Heights	Septic Tank & Sand Filter	5,000	25	Ditch to Cal-Sag Channel
Carl Sandburg High School, Orland Park	Primary Tank Filter & Final Sand	24,000	50	Ditch to McGinnis slough to Cal-Sag
Community Center Foundation, Palos Park	Septic Tank to Sand Filter	2,000	10	Ditch to Mill Cree to Cal-Sag
Country Squire Sub-Division, Palos Heights	Oxidation Pond	21,000	150	Ditch to Cal-Sag Channel
Fernway Sub-Division, Westhaven	Extended Aeration Plant	200,000	860	Ditch to Tinley Creek to Cal-Sag
Holy Family Villa, Lemont	Imhoff Tank & Sand Filter	16,000	5	Ditch to Cal-Sag
	Sub Total	268,000	1,100	

APPENDIX NO. 3b

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

CAL-SAG CHANNEL

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Jardines Motel Tinley Park	Imhoff Tank & Sand Filter	2,000	5	Ditch to Tinley Creek to Cal-Sag
Kennedy School Palos Park	Imhoff Tank & Sand Filter	20,000	5	Ditch to Cal-Sag
Matterhorn Supper Club, Palos Park	Extended Aeration Plant & Oxidation Pond	3,000	5	Ditch to Mill Creek to Cal-Sag
Midlothian Country Club, Midlothian	Septic Tank & Sand Filter	10,000	5	Ditch to Cal-Sag
Oak Ridge School Palos Hills	Imhoff Tank & Sand Filter	5,000	5	Lucas Ditch to Cal-Sag
Palos Community Consolidated School Palos Heights	Primary Tank, Filter, & Final Tank	15,000	25	Ditch to Cal-Sag
	Sub Total	55,000	50	

APPENDIX NO. 3c

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

CAL-SAG CHANNEL

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Palos Heights Elementary School Palos Heights	Imhoff Tank & Sand Filter	4,000	12	Ditch to Cal-Sag
Palos West Elementary High School, Palos Park	Extended Aeration Plant	14,000	20	Marsh to Mill Creek to Cal-Sag
Playfield Sub-Division, Crestwood	Primary Tank, Filter, & Final Tank	144,000	300	Ditch to Cal-Sag
Silver Lake Country Club, Orland Park	Extended Aeration Plant	5,000	25	Tinley Creek Sag- Channel
Sunnybrook School Orland Park	Two septic tanks & Sand Filter	9,000	15	Tinley Creek to Cal-Sag
	Sub Total	176,000	372	
	Total	499,000	1,522	

APPENDIX NO. 3d

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

CALUMET RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Glenridge Sub-Division. Westhaven	Oxidation Pond	110,000	420	Butterfield Creek to Thorn Creek to Little Calumet
Allisters Convalescent Home Country Club Hills	Septic Tank & Sand Filter	4,000	10	Ditch to Calumet Union Dra-Ditch to Little Calumet
Washington Park Race Track, Homewood	Oxidation Pond & Chlorination	75,000	600	Ditch to Little Calumet
	Total	190,000	1,030	

APPENDIX NO. 3e

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

SANITARY AND SHIP CANAL

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Mt. Assissi Academy Lemont	Oxidation Pond	40,000	180	Ditch to I & M Canal to Sanitary & Ship Canal
Alexander Chemical Lemont	Septic Tank & Sand Filter	2,500	5	Ditch to I & M Canal to Sanitary & Ship Canal
Fournier Institute Lemont	Primary Tank final tank & Filter	15,000	60	Ditch to I & M Canal to Sanitary & Ship Canal
Franciscan Sisters Lemont	Extended aeration plant	15,000	25	Quarry to I & M Canal to Sanitary & Ship Canal
Mineral Industries	Septic tank & sand filter	300	1	Main Channel-Ship & Sanitary Canal
Lemont Manufacturing Lemont	Extended Aeration Plant	9,000	35	Sanitary & Ship Canal
Fisher Body Domestic	Primary Tank, filter & final tank	120,000	25	Ditch to Sanitary & Ship Canal
Fischer Body Industrial Willow Springs	Chemical precipitation	435,000	2200	Ditch to Sanitary & Ship Canal
	Sub Basin Total	636,800	2532	

APPENDIX NO. 3f

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

DES PLAINES RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Willoway Terrace Mobile Homes, Des Plaines	Imhoff Tank & Sand Filter	150,000	200	Ditch to Higgins Creek to Des Plaines River
Sisters of Sacred Heart, Des Plaines	Aeration Plant Extended	7,500	50	Ditch to Des Plaines River
Smith and Dawson Sub-Division Prospect Heights	Aeration Plant Extended	3,000	20	Ditch to McDonald Creek to Des Plaines
Saint Alphonsus School, Prospect Heights	Septic Tank & Sand Filter	30,000	70	Ditch to McDonald Creek to Des Plaines
Standard Oil Tank Farm, Elk Grove	Aeration Plant Extended	1,500	10	Ditch to Higgins Creek to Des Plaines
Timbercrest Estates, Shaumberg Center	Aeration Plant Extended	20,000	40	Ditch to Salt Creek to Des Plaines
	Sub Total	212,000	390	

APPENDIX NO. 3g

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

DES PLAINES RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Touhy Mobil Trailer Park, Elk Grove	Aeration Plant Extended	70,000	170	Ditch to Des Plaines
Wheeling Trailer Park, Wheeling	Aeration Plant Extended	3,300	15	Ditch to Des Plaines
Bee Dozier Nursing Home, Palatine	Aeration Plant Extended	10,000	50	Ditch from Forest preserve slough to Salt Creek to Des Plaine
Bornhoff Dairy, Wheeling	Oxidation Pond	2,000	10	Ditch to Des Plaines River
Ehler Wenborg shopping center, Prospect Heights	Aeration Plant Extended	3,000	20	Ditch to McDonald Creek to Des Plaines
Elk Grove Trailer Park, Elk Grove	Aeration Walker Process	3,000	29	Ditch to Salt Creek to Des Plaines
	Sub Total	91,300	294	

APPENDIX NO. 3h

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

DES PLAINES RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Lehmans Trailer Park, Elk Grove	Aeration Plant Extended	50,000	120	Ditch to Higgins Creek to Des Plaines
Flamingo Motel, Wheeling	Imhoff Tank & Sand Filter	15,000	50	Ditch to Des Plaines
Lift Parts, Des Plaines	Aeration Plant Extended	2,000	10	Ditch to Higgins Creek to Des Plaines
Oasis Drive In Theater & Trailer Park, Des Plaines	Aeration Plant Extended	10,000	100	Ditch to Higgins Creek to Des Plaines
Out Post Motel, Arlington Heights	Aeration Plant Extended	3,000	10	Ditch to McDonald Cree to Des Plaines
Argonne National Lab., Lemont	Primary Tank, Filter & Final Tank	75,000	95	Ditch to Des Plaines River
Blackhawk Motel, Western Springs	Spectic Tank & Sand Filter	3,000	5	Ditch to Flagg Creek to Des Plaines R.
	Sub Total	158,000	390	

APPENDIX NO. 31

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

DES PLAINES RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Green Acres Grailer Court Western Springs	Septic Tank & Sand Filter	5,000	15	Ditch to Flagg Creek to Des Plaines
House of Correction, Willow Springs	Imhoff Tank & Sand Filter	25,000	35	Ditch to Flagg Creek to Des Plaines
Pleasantdale School, Indian Head Park	Primary Tank, Filter & Final Tank	6,000	5	Ditch to Flagg Creek to Des Plaines
Queen of Heaven Cemetery, Westchester	Oxidation Pond	2,000	20	Ditch to Salt Creek to Des Plaines
Wolf Road Trailer Park Western Springs	Imhoff Tank & Sand Filter & Oxidation Pond	9,000	10	Ditch to Flagg Creek to Des Plaines
Spring Lakes Trailer Co. Hanover TWS. Box 70, Rt. 1 Elgin	Aeration Plant Extended	6,000	100	Quarry to Poplar Creek to Du Page R.
	Sub Total	53,000	185	
	Sub Basin Total	514,300	1,259	

APPENDIX NO. 3j

PRIVATELY OWNED AND OPERATED SEWAGE TREATMENT WORKS

NORTH BRANCH CHICAGO RIVER, CHICAGO RIVER AND TRIBUTARIES

Name and Location	Type of Treatment	Discharge Volume GPD	Population Equivalent BOD Basis	Receiving Stream
Villa Moderne Motel Northbrook	Extended Aeration Plant	50,000	150	Ditch to Skokie lagoons to North Br. Chicago River (Skokie River Br.)
Holy Spirit Convent Northfield	Imhoff Tank & Sand Filter	50,000	100	Ditch to North Br. Chicago River (West Branch)
Glenview Mobile Homes Northfield	Aeration Plant-Septic tank & Sand Filter	10,000	10	Ditch to North Br. Chicago River (West Branch)
Lone Tree Sub-Division Wheeling	Imhoff Tank & Sand Filter	50,000	50	Ditch to North Br. Chicago River (West Branch)
	Total for Sub Basin	160,000	310	

Appendix No. 4

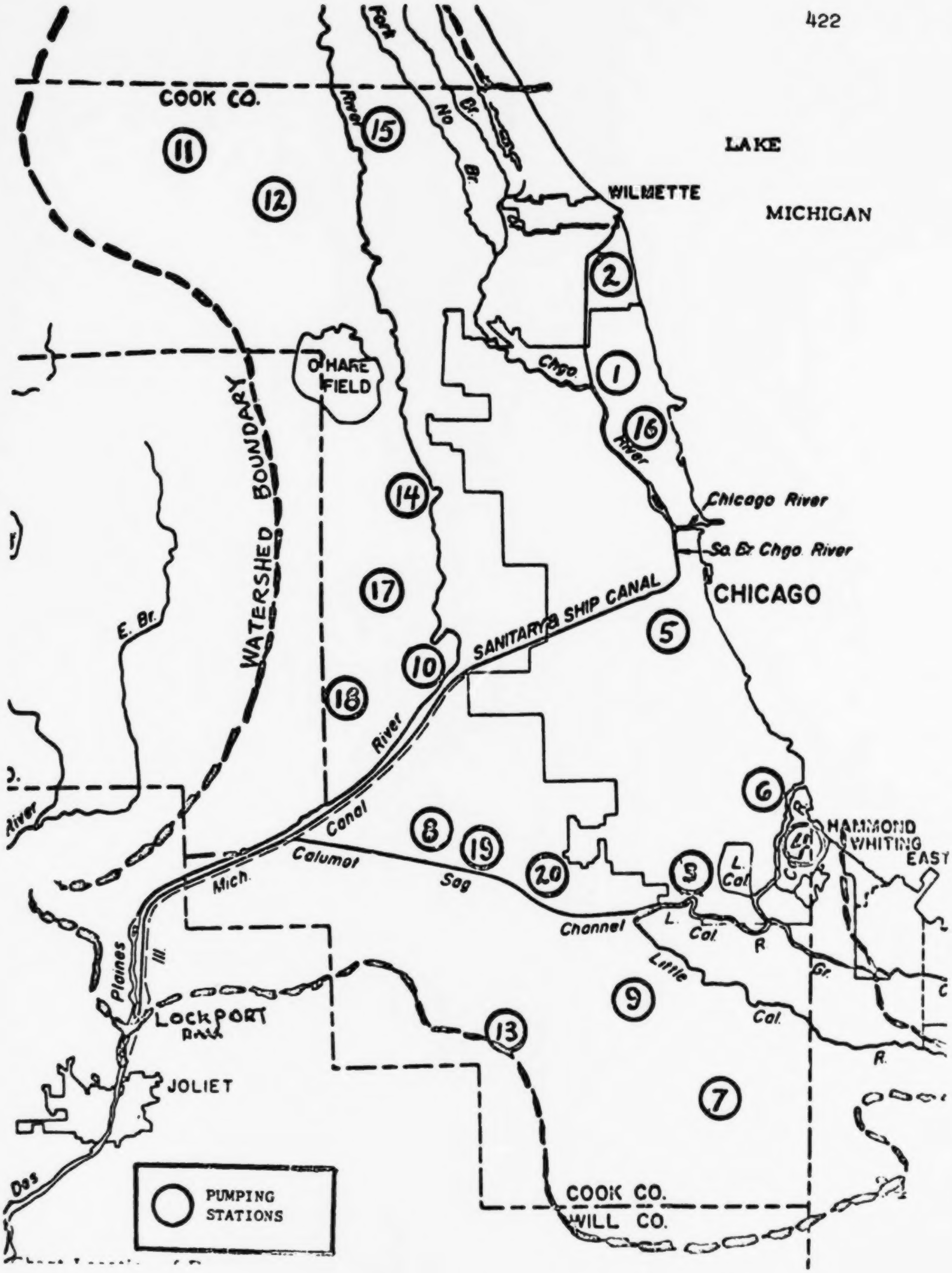
PUMPING STATIONS

Name	Location	Low Flow Pumpage	Storm Pumpage To	Capacity gal. /min.
North Branch	4840 N. Francisco Chicago, Illinois	North Side Interceptor	North Branch of Chicago River	774,000
Evanston	Elmwood Avenue and Lake Street	Lake Street Sewer	Storm runoff by-pass to North Shore Channel	60,000
Calumet Storm	12501 S. Michigan Ave.	Calumet Interceptor and Wentworth Ave. sewer	Cal-Sag Channel or Little Calumet River	511,000
East 122nd Street	122nd Street and Burley Ave., Chicago, Illinois	Avenue "O" Interceptor	Calumet River	175,000
Racine Avenue	3838 S. Racine Avenue Chicago, Illinois	Southwest Interceptor	South Branch of Chicago River	2,715,000
95th Street	95th St. & Baltimore Ave.	Calumet Interceptor	Calumet River	383,750
Glenwood	Glenwood Rd. three blocks east of Cottage Grove Ave.	Glenwood Force Main	No Diversion	9,600
Hickory Hills	10420 S. Roberts Road Palos Hills, Illinois	Calumet Interceptor	Cal-Sag Channel	3,000
Markham	161st & Robey Avenue Markham, Illinois	Calumet Interceptor at 15925 S. Mozart Ave.	No Diversion	8,000
McCook	49th St. & Egandale Ave. McCook, Illinois	McCook Sewer	No Diversion	1,300
Palatine	Kenilworth & Doloris Palatine, Illinois	Upper Des Plaines Interceptor	No Diversion	2,000

Appendix No. 4a

PUMPING STATIONS

Name	Location	Low Flow Pumpage	Storm Pumpage To	Capacity gal./min.
Prospect Meadows	Rand and Golf Roads Prospect Meadows, Ill.	Upper Des Plaines Interceptor	No Diversion	3,000
Tinley Park	175th St. & Ridgeland Ave., Tinley Park, Ill.	Calumet Interceptor at 171st and Laramie	No Diversion	3,000
Upper Des Plaines	Thatcher Ave., near North Ave., River Forest, Illinois	South part of Upper Des Plaines Interceptor	No Diversion	40,000
Walters Road	Walters Road and Sanders Road, Wheeling Illinois	Harms Road Sewer	No Diversion	4,300
Wellington	Wellington and Leavitt Chicago, Illinois	North Side Interceptor	No Diversion	22,500
Westchester	Roosevelt and Gardner Road, Westchester, Ill.	Storm Flow Only to Addison Creek	Storm Flow Only to Addison Creek	58,000
Western Springs	55th St. and Fair Elms Western Springs, Ill.	Salt Creek Interceptor	Flagg Creek	8,000
Worth	107th St. & Harlem Ave. Worth, Illinois	Local sewer to Calumet Interceptor	No Diversion	800
Alsip	119th and Crawford Alsip, Illinois	Local to Calumet Interceptor	No Diversion	1,800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CHICAGO
O'HARE FIELD
WATERSHED BOUNDARY
E. Br.
River
SANITARY & SHIP CANAL
River
Canal
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Calumet
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Channel
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WILL CO.
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PUMPING STATIONS

Appendix No. 5

SUMMARY OF INDUSTRIAL DISCHARGES

SUB-BASIN SOURCE	GALLONS OF WASTE	REMARKS
NORTH SHORE CHANNEL	500	Oil, Solids
NORTH BRANCH CHICAGO RIVER	844,619,600	Cooling Water, Oil
LAKE MICHIGAN	440,043,000	Oil Acid Solids B.O.D. (220 P.E.
CAL-SAG	40,073,000	Oil, Chemical, Acid, Iron
CALUMET RIVER & TRIBUTARIES	395,643,100	Cooling Water, Oil, Chemical, Acid, Solids
SHIP & SANITARY CANAL	1,464,876,300	Oil, Solids, Acid Cooling Water, B.O.D., C.O.D. Trade Metals
DES PLAINES RIVER & TRIBUTARIES	1,110,500	Cooling Water, Oil, Chemicals
TOTAL	3,186,366,000	

Appendix No. 6a

INDUSTRIAL WASTES

NORTH SHORE CHANNEL

Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
Illinois Tube Company 3700 W. Touhy Skokie, Illinois	Metal Fabrication	None	None	North Shore Channel
Material Service Yard #30 2400 Main Street Evanston, Illinois	Concrete	Settling Basin Oil - Solids	500	North Shore Channel

Appendix No. 6b

INDUSTRIAL WASTES

Chicago River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
1.	Advance Transformer 2950 North Western	Metal Fabrication	None-Cooling water only	10,000	Chgo. River No. Br.
2.	Chicago Union Station 210 South Canal St.	Maintenance	None-Cooling water only	20,000	Chgo. River So. Br.
3.	Commonwealth Edison 3400 N. California	Power Generation	None-Cooling water only	107,000,000	Chicago River South Branch
4.	Container Corp. of Amer. 404 East North Water St.	Paper & Allied Products	None-Cooling water only	1,000,000	Chicago River
5.	Corbett, J. M. 2500 South Corbett St.	Concrete, Asphalt	Settling Basin Cooling water only	500	Chicago River South Branch
6.	Cuneo Press, Inc. 2242 S. Cottage Grove	Printing	None-Cooling water only	658,000	Chicago River South Branch
7	Curtiss Candy Co. 337 East Illinois	Food Products	None-Cooling water only	10,000	Chicago River
8.	Greyhound Bus Lines 90. N. Halsted Street	Maintenance & Garage	Catch Basins, Oil	1 000 E	Chicago River North Branch
	Imperial Eastman 6300 Howard	Metal Fabrication	None - Oil	1 000 E	Chicago River North Branch

Appendix No. 6c

INDUSTRIAL WASTES

Chicago River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stre
10.	Lissner Paper & Grading 1050 N. Branch Street	Paper & Allied Prod.	None - Domestic	None	Chicago River North Branch
11.	Medill Incinerator No. Br. Chicago River	Garbage	None - Roof drains	None	Chicago River North Branch
12.	Montgomery Ward & Co. 618 West Chicago Ave.	Storage	None-Cooling water only	4,000,000	Chicago River North Branch
13.	Morton Salt Company 1357 Elston Avenue	Storage	None - Runoff	7,100	Chicago River North Branch
14.	No. Amer. Cold Storage 345 North Canal	Storage	None-Cooling water	1,000,000	Chicago River North Branch
15.	Proctor & Gamble 1232 W. North Avenue	Soap-Detergent Manufacturing	None-Cooling water	18,900,000	Chicago River North Branch
16.	Pure Carbonic 1856 S. Lumber Street	Chemical	None-Cooling Water	1.000,000	Chicago River South Branch
17	Sucrest Corporation 330 E. No. Water St.	Food Products	None-Cooling water	2,000.000	Chicago River
18.	Vapor Corporation 6420 W. Howard	Metal Fabrication	None - Oil	2,000	Chicago River North Branch

Appendix No. 6d

INDUSTRIAL WASTES

Chicago River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
19.	Harper and Company 8200 Lehigh Morton Grove	Metal Products	None - Oil	10,000	Chicago River North Branch
20.	Commonwealth Edison 1111 Cermak	Power Generation	None-Cooling water Fly Ash - Alkalinity	709,000,000	Chicago River South Branch
			Total	844,619,600	

Appendix No. 6e

INDUSTRIAL WASTES

Lake Michigan

Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
Columbia Yacht Club Lake Michigan at Monroe Street	Private Club	Sedimentation Tank and Chlorination organic (60 P.E.)	2,000	Lake Michigan
United States Coast Guard Breakwater at Inner Harbor	Government Installation	Septic Tank with Chlorination organic (10 P.E.)	1,000	Lake Michigan (Inner Harbor of Chicago River)
United States Naval Armory Lake Michigan	Government Installation	Septic Tank with Chlorination organic	40,000	Lake Michigan (Inner Harbor of Chicago River)
United States Steel Company 3226 East 89th Street (Calumet Harbor)	Basic Steel and Iron	See Calumet Area Report - Exhibit G March 17, 1967 Oil, acids, solids	440,000,000	Lake Michigan (Cal. Harbor)
		Sub Total	440,043,000	

Appendix No. 6f

INDUSTRIAL WASTES

Cal-Sag Channel

Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
Clark Oil Refining 131st. Kedzie Ave. Blue Island, Ill.	Petroleum Products	Oil-Water Separator Oil-Chemical	40,000,000	Cal-Sag Channel
Gilbert & Bennett Blue Island, Ill	Metal Fabrication	Neutralization Acid-Iron	73,000	Cal-Sag Channel
		Sub Total	40,073,000	

INDUSTRIAL WASTES

Calumet River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
1.	Bulk Terminals 12200 S. Stony Island Ave.	Storage	See Calumet area status report, Mar. 13, 1967 Exhibit G Oil-Chemical	40,000	Calumet River
2.	Catalin Corporation 142nd St. & Paxton Ave.	Chemical	See Calumet area status report, Mar. 13, 1967 Exhibit G Chemical	1,700,000	Calumet River
3.	Commonwealth Edison 3200 E. 100th	Power Generation	None-Cooling water only	134,000,000	Calumet River
4.	Ford Motor Company 12600 S. Torrence Ave.	Metal Fabrication	See Calumet area status report, Mar. 13, 1967 Exhibit G Oil	500,000	Calumet River
5.	General Mills 104th & Muskegon Ave.	Food Products	None-Cooling water	30,000	Calumet River
6.	General Chemical 12260 S. Carondolet	Chemical Products	None-Cooling Water	4,000,000	Calumet River
7.	Great Lakes Carbon 2701 E. 114th Street	Basic iron & steel	None-Cooling Water	30,000	Calumet River
8.	Illinois Central R.R. 135 E. 11th Place	Maintenance	Oil-Water Separator - Oil	60,000	Calumet River
9.	Interlake Steel 135th St. & Perry Ave.	Basic iron & steel	See Calumet area status report, Mar. 13, 1967 Exhibit G.Oil-Acid-Solids	48,000,000	Calumet River

Appendix No. 6h

INDUSTRIAL WASTES

Calumet River and Tributaries

	Name and Address	Classification	Waste Characteristics	Discharge GPD	Receiving Stream
10.	Republic Steel 117th & Burley Ave.	Basic iron and steel	See Calumet area status report, March 13, 1967 Exhibit G -Oil-Acid Solids	85,000,000	Calumet River
11.	Robertson Transform. 136th & Thornton Rd.	Metal Fabrication	Batch - Insignificant chemicals	100	Calumet River
12.	Spencer Chemical 142nd & Paxton	Chemical Products	See Calumet area status report, March 13, 1967 Exhibit G - Chemical	1,500,000	Calumet River
13.	Stauffer Chemical 618 E 138th Street	Chemical Products	None-Cooling water	5,000	Calumet River
14.	United States Steel 3426 E. 89th Street	Basic iron and steel	See Calumet area status report, March 13, 1967 Exhibit G -Oil-Acid-Solids	17.800,000	Calumet River
15.	Valley Mould 108th & Calumet River	Basic iron and steel	Settling Basins Solids bearing	5,000	Calumet River
16.	Wisconsin Steel 106th & Torrence	Basic iron and steel	See Calumet area status report, March 13, 1967 Exhibit G -Oil-Acids-Solids	70.000 000	Calumet River
17.	Interlake Steel 104th & Burley	Basic iron and steel	See Calumet area status report, March 13, 1967 Exhibit G-Oil-Acids-Solids	33.000,000	Calumet River
			Total	395,670,100	

Appendix No. 61

INDUSTRIAL WASTES

Sanitary and Ship Canal

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
1.	American Brake Shoe 2321 S. Hoyne	Metal Fabrication	None, Oil-Acid	10,000	Sanitary and Shi Canal
2.	American Oil 5000 South Harlem	Petroleum	Oil-Water Separator. Oil	1,000 E	Sanitary & Ship Canal
3.	American Sugar Ref. 2905 S. Western	Food Product	None - Cooling water	5,000 E	Sanitary & Ship Canal
4.	Barrett Plastic 2800 S. Sacramento	Petroleum	3 Settling Basins Solids bearing	5,000 E	Sanitary & Ship Canal
5.	Commonwealth Edison 4300 S. Ridgeland	Power Generation	None - Cooling water	833,000,000	Sanitary & Ship Canal
6.	Commonwealth Edison 3501 S. Pulaski	Power Generation	None - Cooling water	609,000,000	Sanitary & Ship Canal
7.	Connelly, Inc. 3154 S. California Ave.	Basic iron products	Settling basins, Oil Sep. Solids bearing	2,000	Sanitary & Ship Canal
8.	Corn Products 63rd and Archer	Food Products	Settling basins. High BOD 122,000 P.E.	20,000,000	Sewer overflow during rainfall
9.	DeMert & Dougherty 5000 W. 41st. Street	Chemical products	None- Cooling water	10,000	Sanitary & Ship Canal
10.	Fisher Body Works 79th & Willow Springs Rd.	Metal Fabrication	Domestic treatment plant. Ind. Chem. precip. Clarifier Acid-Oil-Organic	550,000	Ditch to Sanitar And Ship Canal

Appendix No. 6j

INDUSTRIAL WASTES

Sanitary and Ship Canal

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
11.	Hannah Inland 107th St. & Rt.83	Petroleum	None - Oil	None	Sanitary & Ship Canal
12.	Humble Oil & Ref. 3301 S. California Ave.	Petroleum	None - Oil	None	Sanitary & Ship Canal
13.	Lake River Terminals 5005 S. Harlem Ave.	Chemical Storage	None Chemical-Oil	10,000	Sanitary & Ship Canal
14.	R. Lavin & Sons 3426 S. Kedzie Ave.	Metal Processing	None - Chemical	40,000	Sanitary & Ship Canal
15.	Lemont Mfg. Co. W.Stephen & San. Canal	Basic iron or steel products	Domestic pkg. Plant and settling basins Solids bearing cooling water	100,000	Sanitary & Ship Canal
16.	Mineral Ind., Inc. Lemont, Illinois	Chemical	Clarifier chemical	100	Sanitary & Ship Canal
17.	North American Tank Car 77 S. Wacker Drive Lemont, Plant	Petroleum	None - Oil	100 E.	I & M Canal to Sanitary & Ship Canal
18.	Pure Oil Company 4801 Harlem Avenue	Petroleum	None - Oil	500 E.	Sanitary & Ship Canal
19.	Richardson Chemical Lemont, Illinois	Chemical	Pilot Plant Operation Activated Sludge	250,000	I & M Canal to Sanitary & Ship Canal

Appendix No. 6k

INDUSTRIAL WASTES

Sanitary and Ship Canal

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
20.	Sante Fe Grain El. 2800 S. Winchester	Storage	Septic Tank - Domestic Waste (10 P.E.)	100	Sanitary & Ship Canal
21.	Sante Fe R.R. Yards 3611 W. 38th St.	Maintenance Operations	Separator - Storm Water	5,000	Storm Sewer to San.Ship Canal
22.	Trumbull Asphalt 5900 S. Archer St.	Petroleum	Separator with filtration through straw - Oil	100	I & M Canal to San.& Ship Canal
23.	U.B.S. Chemical Lemont Sag Road	Chemical	Holding tank chemical	5,000	I & M Canal to San.& Ship Canal
24.	Witco Chemical 6200 W. 51st. St.	Chemical	None - Cooling water	1,000 E	GMO Ditch - San.& Ship Canal
25	Globe Oil & Refining Willow Springs	Oil	None - Storm Water	None	Sanitary and Ship Canal
			Total	1,462,994,900	

Appendix No. 6L

INDUSTRIAL WASTES

Sanitary and Ship Canal
Summit Lyons Ditch

	Name and Address	Classification	Waste Characteristics	Discharge GPD	Receiving Stream
1.	Armour Industrial Chem. 8201 W. 47th Street	Chemical Products	None - Boiler Blow down	1,000 E.	Summit Lyons Ditch to San.& Ship Canal
2.	By-Products, Inc. Joliet R. & Rt. 66	Rendering & Kindred Products	Grease Oil Separator Grease - BOD, COD	30,000	Summit Lyons Ditch to San.& Ship Canal
3.	Coan, John 7847 W. 47th St.	Garage and maintenance Operation	Septic Tank Effluent Oil to scavenger	500 E.	Summit Lyons Ditch to San.& Ship Canal
4.	Electromotive 9301 W. 55th St.-Joliet Rd.	Metal Fabrication	Separation with Chemical Treatment Oil & Solids bearing	800,000	Summit Lyons Ditch to San.& Ship Canal
5.	McCook Drum & Barrell 53rd.St. & Rt. #66	Drum & Barrell Cleaning & refinishing	None - Grease and Chem. residue, no oil	2,000 E.	Summit Lyons Ditch to San.& Ship Canal
6.	Motor Oil Refining 7601 W. 47th Street	Petroleum Products	None - Oil	1,000	Summit Lyons Ditch to San.& Ship Canal
7.	Pelron Corporation 7847 W. 47th Street	Chemical	None -	23,400	Summit Lyons Ditch to San.& Ship Canal
8.	Pielet Bros. McCook, Illinois	Storage (Junkyard)	None - Storm Water only	None	Summit Lyons Ditch to San.& Ship Canal
9.	Reynolds Metals 1st. & 49th St.	Metal Production	Chemical treatment & clarification. Acids and Trace Metals	865,000	Summit Lyons Ditch to San.& Ship Canal
10.	Tamms Industries 8000 Joliet Rd.	Chemical	None - Organic & Oil	2,000 E	Summit Lyons Ditch to San.& Ship Canal
11.	Universal Oil Rt. 66 & Lawndale Ave.	Petroleum	Chemical treatment and clarification oil	133,000	Summit Lyons Ditch to San.& Ship Canal
12.	Valspar Corporation 7701 W. 47th St.	Chemical	None - Chemical	23,500	Summit Lyons Ditch to San.& Ship Canal
			Total for Summit Lyons Group	1,881,400	

Appendix No. 6m

INDUSTRIAL WASTES

Des Plaines River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
1.	Amphenol Corp. 2801 S. 25th Ave.	Plating - Degreasing Anodizing Electric components	None Cooling Water	2,000 Est.	Addison Creek to Salt Creek to Des Plaines River
2.	Automatic Electric 400 N. Wolf Rd.	Metal Fabrication	Diverted to sewer- Cooling Water	10,000	Addison Creek to Salt Creek to Des Plaines River
3.	Borg Warner (Spring. Div.) 718 S. 25th Ave.	Metal Fabrication	Oil-Water Separator- Oil	150,000	Addison Creek to Salt Creek to Des Plaines River
4.	Bruning Company 1800 W. Central	Chemical Products	None Cooling Water	5,000	Weller Creek to Des Plaines River
5.	Chicago N. W. R.R. Proviso Yards	Maintenance	Oil-Water Separator - Oil (Avg. 200 ppm)	173,000	Addison Creek to Salt Creek to Des Plaines River
6.	Clow, James B. &Sons Irving Park & Division Bensenville, Illinois	Metal Fabrication	Holding Pond Oil (Avg. 100 ppm)	500,000	Bensenville Ditch to Silver Creek to Des Plaines River
			Sub Total	840,000	

Appendix No. 6n

INDUSTRIAL WASTES
Des Plaines River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
7.	Frederick Post Seegers Road & N.W. Hwy.	Metal Fabrication	None - Cooling Water	5,000	Weller Creek to Des Plaines River
8.	Henry Valve 3215 North Avenue Melrose Park, Illinois	Metal Fabrication	None - Cooling Water	5,000	Silver Creek to Des Plaines River
9.	International Harvester Construction Equipment 10400 W. North Melrose Park, Illinois	Metal Fabrication	Oil Water Separator Oil (Avg. 50 ppm)	250,000	Silver Creek to Des Plaines River
10.	Johnson, J.W. 3100 W. Randolph	Textile Manufacturing	None - Chemical	500	Addison Creek to Salt Creek to Des Plaines River
11.	Material Service Yard #43 3400 W. Lake Street	Concrete	Settling Basin Excessive solids, Oil	200 E	Addison Creek to Salt Creek to Des Plaines River
12.	O'Hare Field Area Lake Area - Schiller Park	Maintenance	None - Chemical-Oil	1,000	Crystal Creek to Des Plaines River
			Sub Total	36,700	

Appendix No. 60

INDUSTRIAL WASTES
Des Plaines River and Tributaries

	Name and Address	Industrial Classification	Type of Treatment Waste Characteristics	Discharge GPD	Receiving Stream
13.	Parker Hannifin 501 S. Wolf Road	Metal Fabrication	None Oil- (600 ppm)	2,000 E	Weller Creek to Des Plaines River
14.	Spraying Systems 3201 Randolph Bellwood, Illinois	Metal Fabrication	None Cooling Water	500	Addison Creek to Salt Creek to Des Plaines River
15.	Thompson Wire 9470 W. King Franklin Park, Ill.	Metal Fabrication	None Cooling Water	5,000	Des Plaines River via Storm Sewer
16.	Western Engine 2626 W. 16th Street Broadview, Ill.	Metal Fabrication	None Oil (Avg.200 ppm)	500 E	Addison Creek to Salt Creek to Des Plaines River
17.	Flexonics Corporation 300 Devon Bartlett, Illinois	Metal Fabrication	None Cooling Water	1,000	Poplar Creek to Du Page River
			Grand Total	885,700	

Appendix No. 7

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
		1967								1967	
1A	NSC 50.03 Wilmette										
	Maximum	12.0								16	
	Minimum	11.0								5	
	Average	11.7								11.0	
1B	NSC 49.89 Linden Ave.						N-NH3				1965
	Maximum	9.3	2	17	140	320	0.10	45	8.7	25.5	1.000
	Minimum	6.6	2	12	110	220	< 0.10	5	8.0	18.5	70
	Average	8.0	2	14	120	270		14	8.3	22.0	310
2	NSC 49.23 Central Ave.										1965
	Maximum	9.3			124	280		16	8.4	25	90.000
	Minimum	6.4			102	250		8	7.0	16.5	50
	Average	7.9			113	260		10	7.7	21	8.740
3	NSC 47.05 Dempster Ave										
	Maximum	8.2			140	280		45	8.1	26.4	53.000
	Minimum	2.0			100	220		10	7.4	13.0	500
	Average	5.1			121	250		19	8.0	19.7	4.995
4	NSC 46.05 Oakton St.						N-NH3				
	Maximum	7.7	7	32	130	320	1.5	43	8.6	26.0	60.000
	Minimum	2.1	< 1	8	110	220	0.1	6	7.2	11.0	300
	Average	4.9	3.8	18	121	270	0.4	21	8.3	19.0	5.934

Appendix No. 7a

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No. Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
5 NSC 45.55 Howard St.										
Maximum	7.0	-	-	160	575	-	27	8.3	26	
Minimum	4.5	-	-	121	350	-	10	7.2	18	
Average	5.8	-	-	140	470	-	15	7.8	22	
6 NSC 45.06 Touhy Ave.						N-NH3				
Maximum	7.6	16	50	148	560	5.6	25	7.5	26.0	350,000
Minimum	3.2	2	20	100	440	1.5	7	7.2	14 5	2,900
Average	5.4	4.9	36	130	490	4.6	13	7 3	20.3	133,900
7 NSC 43.03 Bryn Mawr Ave.						1965				
Maximum	6.1	-	-	155	520	4.8	27	7.4	26.0	1,500,000
Minimum	2.7	-	-	96	360	0.25	8	7.1	17.5	70,000
Average	4.4	-	-	136	470	1.50	18	7.3	20 8	307,300
8 NBCR 42.26 Argyle St.										
Maximum	7.3	8	43	152	620	-	28	7 5	27.0	1,300,000
Minimum	2.2	3	26	136	360	-	8	7.1	14.0	80,000
Average	4.8	4.7	32	142	480	-	17	7.3	20 5	467,100
9 NBCR 41.98 Lawrence Ave.						1965				
Maximum	5.5	-	-	164	540	4.3	30	7.4	26 0	1,200,000
Minimum	2.0	-	-	136	470	0.25	8	7.2	21 0	30,000
Average	3.8	-	-	148	500	1.43	16	7.3	23.5	283,600

Appendix No. 7b

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/l 1	BOD mg/l 2	COD mg/l 3	T. Alk. CaCO3 mg/l 4	Spec. Cond. umhos 5	No_2No_3 N mg/l 6	Turb. JCU units 7	pH units 8	Temp. °C 9	Coliform per 100 ml. 10
10	NBCR 40.88 Irving Park Rd.						$N-NH_3$				
	Maximum	4.5	6	40	165	540	-	28	7.5	26.0	
	Minimum	1.5	3	36	133	360	-	10	7.0	15.0	
	Average	3.0	4.2	37	152	490	3.8	15	7.4	20.5	
11	NBCR 39.81 Belmont Ave						1965				
	Maximum	4.6	-	-	164	640	4.5	17	7.4	28.0	
	Minimum	1.1	-	-	140	480	0.25	11	7.3	19.0	
	Average	2.9	-	-	154	566	1.42	12	7.3	24.0	
12	NBCR 39 45 Western Ave.						1965				
	Maximum	5.7	50	43	175	600	4.6	24	7.5	27.0	740,000
	Minimum	0.9	3	24	140	380	0.28	8	7.0	14.5	40,000
	Average	3.5	3.9	33	156	550	1.62	12	7.3	20.8	209 900
13	NBCR 38.37 Fullerton Ave.						1965				
	Maximum	4.4	-	-	163	650	6.3	20	7.5	27.0	800,000
	Minimum	0.5	-	-	148	490	0.28	7	7.1	14.5	27,000
	Average	2.5	-	-	156	530	2.02	13	7.3	20.8	170,700
14	NBCR 37 98 Ashland Ave.						1965				1965
	Maximum	2.8	-	-	195	650	6.7	22	7.5	27.0	2,500,000
	Minimum	0.4	-	-	145	400	0.28	10	7.2	20 0	60,000
	Average	1.6	-	-	167	570	2 12	14	7.3	24.0	618,700

Appendix No. 7c

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/l 1	BOD mg/l 2	COD mg/l 3	T. Alk. CaCO3 mg/l 4	Spec. Cond. umhos 5	No_2No_3 N mg/l 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
15	NBCR 37.53 Cortland Ave.						N-NH_3				
	Maximum	4.5	9	99	180	652	5.5	25	7.5	27.0	800,000
	Minimum	0.0	4	7	162	380	3.5	8	7.1	15.0	25,000
	Average	2.3	6.2	38	168	520	4.9	13	7.3	21.0	127,000
16	NBCR 36.85 North Avenue						1965				
	Maximum	5.3	-	-	180	650	6.8	30	7.5	27.0	2,300,000
	Minimum	0.4	-	-	140	480	0.28	9	7.1	16.0	24,000
	Average	2.9	-	-	162	510	2.64	18	7.2	22.0	109,000
17.	NBCR 35 01 Grand Avenue						1965				
	Maximum	4.1	8.0	99	160	580	9.6	16	7.3	28.0	3,400,000
	Minimum	0.0	2.2	7	140	500	2.0	8	7.1	14.0	19,000
	Average	2.1	4.6	38	152	510	5.5	12	7.2	21.0	87,620
18	NBCR 34 82 Kinzie Avenue						1965				1965
	Maximum	2.2	-	-	200	650	6.3	27	7.4	28.0	2,700,000
	Minimum	0.2	-	-	120	440	0.2	10	7.1	17.5	40,000
	Average	1.2	-	-	159	550	2.05	18	7.2	23.0	544,000
19	CR 34.78 Wells Avenue						N-NH_3				
	Maximum	9.6	7.7	48	144	440	5.8	13	8.1	26.0	100,000
	Minimum	1.3	0.9	4	120	270	0.2	3	7.3	12.5	< 100
	Average	5.5	3.2	22	131	334	1.3	10	7.5	19.0	3,267

Appendix No. 7d

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
21.	SBCR 34.45 Randolph Street						N-NH3				
	Maximum	7.1	8	50	147	580	3.2	28	7.8	26.0	140,000
	Minimum	0.3	1	8	140	375	0.4	5	7.0	13.0	7,000
	Average	3.8	3.6	30	143	448	3.5	12	7.3	20.0	36,900
22.	SBCR 34 25 Madison Street		1965	1965		1965	1965 N-NH3				
	Maximum	-	9.9	104	-	775	6.6	-	7.8	24.5	
	Minimum	-	2.0	15	-	320	0.5	-	6.9	10.5	
	Average	-	5	39	-	453	3.7	-	7.4	18.0	
23.	SBCR 31.67 Halsted Street						1965				
	Maximum	7.1	-	-	170	580	4.2	19	7.6	29.0	70,000
	Minimum	0.6	-	-	143	350	0	4	7.1	14.0	1,000
	Average	3.9	-	-	155	406	1.25	11	7.4	22.0	9,35
24.	SSC 30.55 Ashland Avenue						N-NH3				
	Maximum	8.1	5.0	71	140	600	1.7	25	8.0	31.0	220,[illegible]
	Minimum	0.5	2	17	120	230	1.0	4	7.1	15.0	3,3[illegible]
	Average	4.9	3.0	35	131	386	1.1	13	7.5	23.0	13,81[illegible]
25.	SSC 28.34 Kedzie Avenue						1965				
	Maximum	6.5	-	-	156	500	5.0	12	7.9	28.0	180,000
	Minimum	0.0	-	-	145	240	0.2	4	7.0	17.0	2,000
	Average	3.5	-	-	153	370	1.13	10	7.5	23.0	19,130

Appendix No. 7e

Summary of Chemical and Bacteriological Data

MSD River and Waterway 1966

No. Station Code Name	DO mg/l 1	BOD mg/l 2	COD mg/l 3	T.Alk. CaCO3 mg/l 4	Spec. Cond. umhos. 5	No_2No_3 N mg/l 6	Turb. JCU units 7	ph units 8	Temp. o C 9	Coliform per 100 ml 10
26. SSC 27.27 Pulaski Rd.						1965				
Maximum	6.4	-	-	166	560	4.6	34	7.8	36.0	280,000
Minimum	0.2	-	-	150	260	0.1	5	7.2	22.0	<1,000
Average	3.9	-	-	157	433	1.28	17	7.3	24.0	21,360
27. SSC 26.20 Cicero Avenue						1965				
Maximum	6.1	14.0	64	160	625	4.3	27	7.9	37.0	700,000
Minimum	0.2	2.0	12	100	440	0.1	5	7.1	18.5	< 1,000
Average	3.4	5.0	38	145	511	1.38	15	7.4	24.0	20,170
28. SSC 25.73 Central Avenue						1965				
Maximum	4.9	-	-	160	625	4.3	18	7.4	36.0	440,000
Minimum	0.6	-	-	140	440	0	9	7.0	20.0	1,400
Average	2.9	-	-	149	5.18	1.39	14	7.2	23.0	50,940
29. SSC 24.14 N. Ridgeland Lt.						1965				
Maximum	5.1	-	-	180	720	2.9	-	7.8	35.0	4,900,000
Minimum	2.0	-	-	160	370	0.1	-	7.0	22.0	700
Average	3.6	-	-	165	552	0.96	-	7.5	29.0	145,900
30. SSC 22.98 Harlem Avenue						NH_3-N				
Maximum	6.4	17	66	160	710	9.7	14	7.8	35.0	5,700,000
Minimum	0.2	2.6	21	154	340	2.0	5	7.2	19.0	< 1,000
Average	3.4	6.1	43	158	598	5.4	11	7.3	28.0	110,200

Appendix No. 71

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
			1965	1965			1965				
31	SSC 21.98 Lawndale Ave.										
	Maximum	4.7	10	80	170	710	2 8	18	8.0	34.0	3,200,000
	Minimum	0.7	3.5	28	160	460	< 0.1	4	7.3	22.0	< 10,000
	Average	2.6	6.0	45	163	590	0.84	9	7.4	30.0	232,500
32	SSC 18.37 U.S. Hwys. 12,20 &45						N-NH3				
	Maximum	4.4	7	47	186	890	8.0	14	7.3	33.0	1,800,000
	Minimum	0.0	4	23	170	600	5.5	3	7.1	18.0	70,000
	Average	2.4	5.2	45	180	617	6.3	7	7.2	22.0	357,200
33	SSC 16.84 Willow Springs Hwy.						N-NH3				
	Maximum	4.3	9	71	190	750	10.3	-	7.8	33.0	820,000
	Minimum	0.2	3	28	174	360	4.5	-	7.2	18.0	27,000
	Average	2.6	5.2	44	182	420	6.6	-	7.3	22.0	163,800
							1965				
34.	SSC 13.08 Hwy83		1965	1965			NH_3-N				
	Maximum	3.7	10	53	200	725	12.1	-	7.5	34.0	850,000
	Minimum	0.0	2.7	31	150	570	3.1	-	7.1	18.0	45,000
	Average	2.0	5.3	42	176	650	7.1	-	7.2	22.0	145,900

Appendix No. 7g

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 m 10
35	SSC 9 51 Stephen Road										
	Maximum	4.7	9.4	26.1	224	943	9.2	56	7.5	28.0	280,000
	Minimum	0.4	4.0	59.9	135	563	5.7	25	7.1	7	8,000
	Average	2.1	6.5	41.9	178	756	7.3	36	7.3	17.5	36,620
36.	SSC Lockport										
	Maximum	3.2	15	51	190	888	9.1	59	7.7	27.3	
	Minimum	0.8	7.4	28	118	559	6.3	25	7.1	13	
	Average	1.5	11.0	35	156	741	7.3	34	7.3	19.8	
37	Des Plaines River - Lemont Road										
	Maximum	12.3	11.0	54.2	260	1169	3.5	142	8.6	28.0	
	Minimum	3.9	3.3	30.2	181	691	2.0	34	7.8	0.0	
	Average	9.1	7.2	39.7	217	888	2.9	79	8.1	12.3	

Appendix No. 7h

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml 10
41	CH 43.14 Breakwater Entrance	1965		1965	1965	1965	1965		1965	1965	1965
	Maximum	9.0	-	61	142	275	0.8	-	7.8	24	420
	Minimum	7.5	-	7	88	260	0.2	-	7.4	17	30
	Average	8.1	-	22	93	270	0.4	-	7.6	20	150
42.	CH 42 6 Mid-Inner Harbor										
	Maximum										
	Minimum										
	Average										
43.	CH 42.40 Mouth Cal. River	1965		1965	1965	1965	1965		1965	1965	1965
	Maximum	8.0	-	73	128	380	0.4	-	7.8	25	1,400
	Minimum	5.9	-	7	78	270	0.2	-	7.4	18.5	70
	Average	7.2	-	20	107	283	0.3	-	7.6	21	363
44.	CaR 41.64 Ewing Ave.										
	Maximum	12.2	4	24	195	500	5.0	-	8.4	25	44,000
	Minimum	3.5	<1	4	84	200	0.1	-	6.6	0	40
	Average	7.2	1	12	123	280	0.9	-	7.9	13	633
45	CaR 39.81 106th St.										
	Maximum	11.4	11	75	155	680	4.8	-	8.1	35	37,500
	Minimum	3.2	1	4	94	200	0.2	-	7.1	5	10
	Average	6.2	2	17	119	340	1.3	-	7.7	18	543

Appendix No. 71

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No. Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 ml. 10
46. CaR 37.07 Torrence Ave.										
Maximum	10.7	15	43	165	600	6.5	-	8.0	30	31,000
Minimum	1.1	1	8	60	260	0.2	-	6.7	3	120
Average	4.3	3	19	109	390	1.5	-	7.4	17	1,450
47 WLS Wolf Lake Spillway										
Maximum	13.7	4	39	150	480	6.4	-	8.6	26	600
Minimum	5.3	1	12	95	300	0.1	-	7.2	0	5
Average	9.2	2	21	114	370	0.9	-	8.2	12	29
48. WLD Carondolet Road										
Maximum	13.1	7	93	150	480	2.0	-	9.9	26	24,000
Minimum	4.5	1	8	80	330	0.1	-	7.6	0	5
Average	8.0	2	25	113	380	0.8	-	8.6	12	199
49. CaR 36.01 130th St.										
Maximum	10.5	11	60	155	600	7.0	-	8.1	29	77,000
Minimum	1.1	1	8	43	290	0.3	-	6.8	0	10
Average	5.1	4	21	114	430	1.9	-	7.5	15	710
50. GCR 34.83 Torrence Ave.										
Maximum	10.2	36	120	470	950	18.0	-	7.8	25	900,000
Minimum	0.5	1	14	118	460	0.3	-	6.6	0	2,000
Average	3.0	11	52	189	710	3.5	-	7.4	13	140,000

Appendix No. 7j

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No. Station Code Name	DO mg/l 1	BOD mg/l 2	COD mg/l 3	T. Alk. CaCO3 mg/l 4	Spec. Cond. umhos 5	No_2No_3 N mg/l 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 s 10
51 LCR 31.34 Indiana Avenue										
Maximum	9.5	18	80	175	650	7.0	-	7.9	28	1,300,000
Minimum	0.5	<1	8	60	310	0.4	-	6.3	0	900
Average	5.2	5	32	119	490	2.2	-	7.5	14	16,700
52. LCR 29.02 Halsted Street										
Maximum	7.9	17	70	345	1000	14.0	-	7.9	27	11,000,000
Minimum	< 0.1	<1	14	85	370	0.6	-	6.7	0	10,000
Average	4.1	6	45	145	660	2.4	-	7.2	15	170,000
53. BLCR 33 53 Indiana Ave.										
Maximum	8.5	15	159	364	2100	10.2	-	8.0	27	660,000
Minimum	0.1	< 1	18	115	600	0.8	-	7.4	2	4,700
Average	4.4	7	57	258	1370	3.4	-	7.6	13	62,300
54. BLCR 29.18 Ashland Avenue										
Maximum	9.9	15	128	345	2000	13.4	-	8.1	27	900,000
Minimum	0.6	2	28	120	520	0.3	-	7.3	2	5,100
Average	4.5	6	48	275	1290	3.8	-	7.7	14	56,500
55. CSC 27.99 Ashland Ave.										
Maximum	8.1	13	70	210	1000	14.2	-	7.9	27	3,100,000
Minimum	< 0.1	2	21	125	520	0.3	-	6.9	0	26,000
Average	4.2	6	43	161	750	2.2	-	7.3	14	147,000

Appendix No. 7L

Summary of Chemical and Bacteriological Data

MSD River and Waterways 1966

No.	Station Code Name	DO mg/1 1	BOD mg/1 2	COD mg/1 3	T. Alk. CaCO3 mg/1 4	Spec. Cond. umhos 5	No_2No_3 N mg/1 6	Turb. JCU units 7	pH units 8	Temp. o C 9	Coliform per 100 m 10
56.	CSC 23.97 Cicero Avenue										
	Maximum										2,400,000
	Minimum										62,000
	Average										198,000
57.	CSC 16.51 104th Street										
	Maximum										260,000
	Minimum										1,000
	Average										28,800
58.	CSC 13.11 U.S. Hwy. #83										
	Maximum										1,700,000
	Minimum										1,700
	Average										11,500

Appendix No. 8
Sampling Stations - Locations and Designations
Major Waterways Systems

No.	Station Code	Location	River System	Comments
1A	NSC 50.03	Wilmette Pumping Station	North Shore Channel	Above Wilmette Locks
1B	NSC 49.89	Linden Avenue	North Shore Channel	Below Wilmette Locks
2.	NSC 49.23	Central Avenue	North Shore Channel	
3.	NSC 47.05	Dempster Avenue	North Shore Channel	
4.	NSC 46.05	Oakton Street	North Shore Channel	Above North Side Treatment Works
5.	NSC 45.55	Howard Street	North Shore Channel	Below North Side Treatment Works
6.	NSC 45.06	Touhy Avenue	North Shore Channel	
7.	NSC 43.03	Bryn Mawr Avenue	North Shore Channel	Above North Branch Chicago River Junctio
8.	NBCR 42.26	Argyle Street	North Branch Chicago River	Below North Branch Chicago River Junctio
9.	NBCR 41.98	Lawrence Avenue	North Branch Chicago River	Below Lawrence Avenue Pumping Station
10.	NBCR 40.88	Irving Park Road	North Branch Chicago River	
11.	NBCR 39.81	Belmont Avenue	North Branch Chicago River	
12.	NBCR 39.45	Western Avenue	North Branch Chicago River	
13.	NBCR 38.37	Fullerton Avenue	North Branch Chicago River	
14.	NBCR 37.98	Ashland Avenue	North Branch Chicago River	
15.	NBCR 37.53	Cortland Avenue	North Branch Chicago River	
16.	NBCR 36.85	North Avenue	North Branch Chicago River	Above North Branch Canal
17.	NBCR 35.01	Grand Avenue	North Branch Chicago River	Below North Branch Canal
18.	NBCR 34.82	Kinzie Avenue	North Branch Chicago River	Above Chicago River Junction
19.	CR 34.78	Wells Avenue	Chicago River	Above North Branch Chicago River Junctio

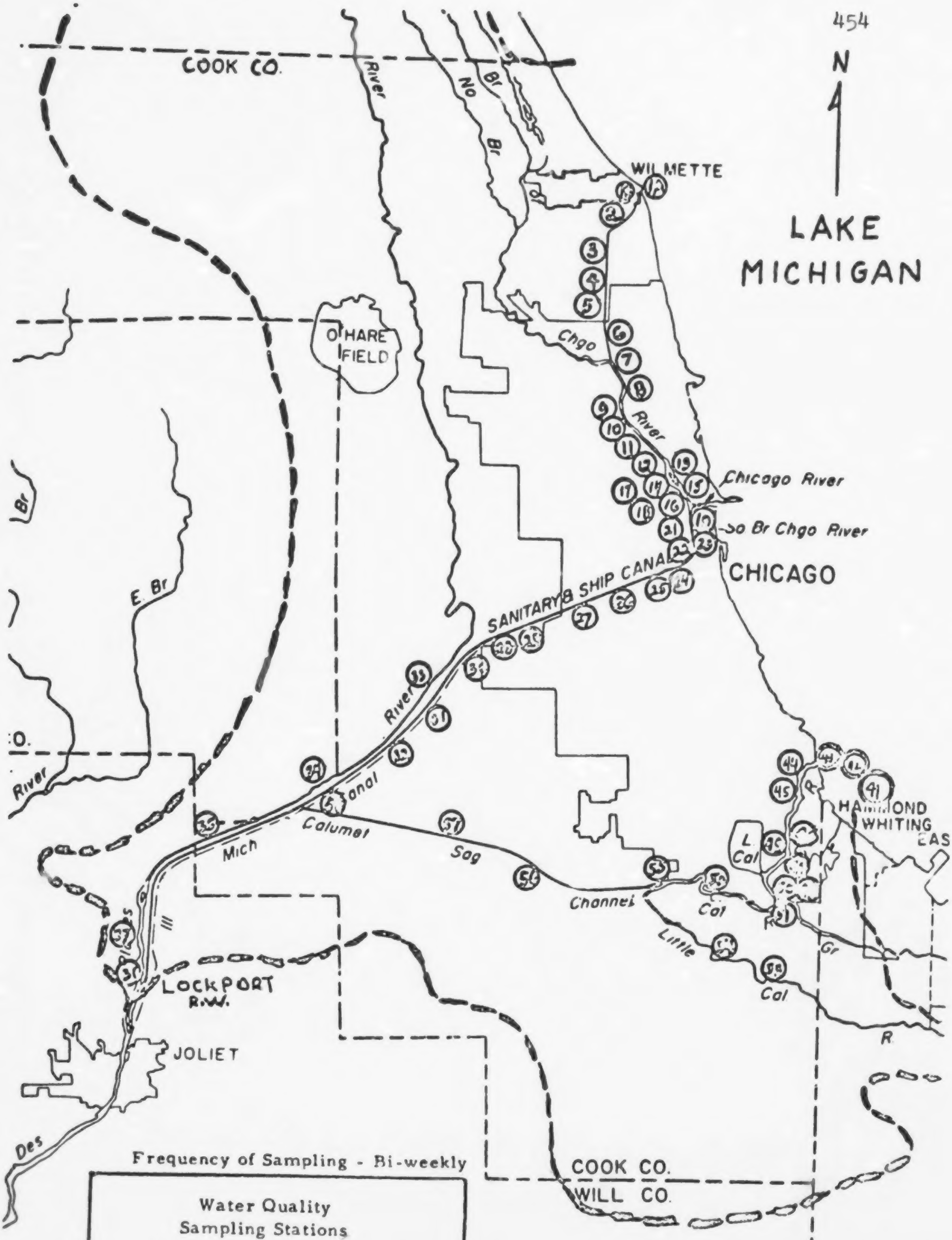
Appendix No. 8a

Sampling Stations - Locations and Designations
Major Waterways Systems

No.	Station Code	Location	River System	Comments
21.	SBCR 34.45	Randolph Street	South Branch Chicago River	Below Chicago River Junction
22.	SBCR 34.25	Madison Avenue	South Branch Chicago River	
23.	SBCR 31.67	Halsted Street	South Branch Chicago River	Above Racine Avenue Pump Station
24.	SSC 30.55	Ashland Avenue	Chicago Sanitary & Ship Canal	Below Racine Avenue Pump Station
25.	SSC 28.34	Kedzie Avenue	Chicago Sanitary & Ship Canal	
26.	SSC 27.27	Pulaski Road	Chicago Sanitary & Ship Canal	
27.	SSC 26.20	Cicero Avenue	Chicago Sanitary & Ship Canal	
28.	SSC 25.73	Central Avenue	Chicago Sanitary & Ship Canal	Above West Southwest S. T. W.
29.	SSC 24.14	No. Ridgeland Lt.	Chicago Sanitary & Ship Canal	Below West Southwest S. T. W.
30.	SSC 22.98	Harlem Avenue	Chicago Sanitary & Ship Canal	
31.	SSC 21.98	Lawndale Avenue	Chicago Sanitary & Ship Canal	
32.	SSC 18.37	U.S. Highways 12-20-45	Chicago Sanitary & Ship Canal	
33.	SSC 16.84	Willow Springs Highway	Chicago Sanitary & Ship Canal	
34.	SSC 13.08	Highway #83	Chicago Sanitary & Ship Canal	Above Cal-Sag Channel Junction
35.	SSC 9.51	Lemont Road - Stephen Rd.	Chicago Sanitary & Ship Canal	
36.	SSC 0.18	Lockport	Chicago Sanitary & Ship Canal	
37.	DP	Lemont Rd.	Des Plaines River	

Appendix No. 8b
Sampling Stations - Location and Designations
Calumet Waterway System

No.	Station Code	Location	River System	Comments
41.	CH 43.14	Breakwater Entrance	Calumet Harbor	
42.	CH 42.6	Mid-Inner Harbor	Calumet Harbor	
43.	CH 42.40	Mouth Calumet River	Calumet River - Harbor	
44.	CaR 41.64	Ewing Avenue	Calumet River	
45.	CaR 39.81	106th Street	Calumet River	
46.	CaR 37.07	Torrence Avenue	Calumet River	
47.	WLS	Wolf Lake Spillway	Wolf Lake	Upper Point on Trib. to Calumet River
48.	WLD	Carondolet Road	Wolf Lake Ditch	Lower Point on Trib. to Calumet River
49.	CaR 36.01	130th Street	Calumet River	Above T.J.O. Lock
50.	GCR 34.83	Torrence Avenue	Grand Calumet River	Trib. Point to Calumet R. below T.J.O. Lock.
51.	LCR 31.34	Indiana Avenue	Little Calumet River	Above Calumet Treatment Works
52.	LCR 29.02	Halsted Street	Little Calumet River	Below Calumet Treatment Works
53.	BLCR 33.53	Indiana Avenue	Branch Little Calumet River	Upper Point on Trib. to Little Calumet R.
54.	BLCR 29.18	Ashland Avenue	Branch Little Calumet River	Lower Point on Trib.to Little Calumet R.
55.	CSC 27.99	Ashland Avenue	Cal-Sag Channel	Below Junction with Branch Little Cal R.
56.	CSC 23. 97	Cicero Avenue	Cal-Sag Channel	
57.	CSC 16.51	104th Street		
58.	CSC 13.11	U.S. Highway #83	Cal-Sag Channel	Above Junction with S&SC



Frequency of Sampling - Bi-weekly

Water Quality
Sampling Stations

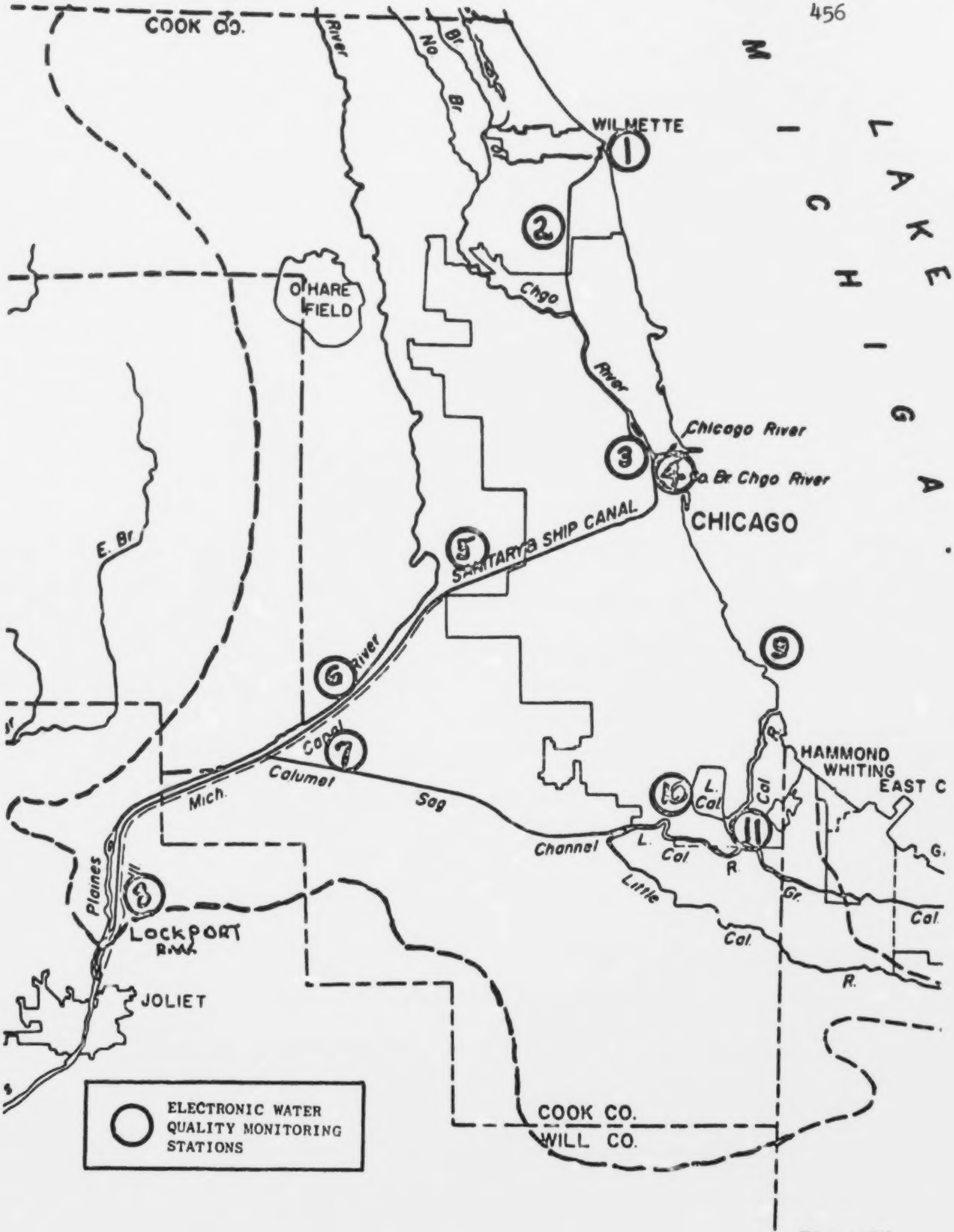
Figure 11

J. E. Egan

Automatic Monitoring Stations - Locations

1. Wilmette Pumping Station
2. North Side Sewage Treatment Plant
3. Ohio - Ontario Expressway Bridge
4. Outer Drive Bridge
5. West - Southwest Sewage Treatment Plant
6. Willow Springs
7. Calumet-Sag Channel near Archer Avenue
8. Lockport
9. South District Filtration Plant
10. Calumet Sewage Treatment Plant
11. Thomas J. O'Brien Locks

At the present time there is one automatic monitoring station at Lockport. It is planned to increase this to two in the next year and then to nine additional stations in the following two to five year period. At these stations, eight water quality parameters will be measured. These are dissolved oxygen, temperature, pH, conductivity, turbidity, chlorides, chlorine residual, and oxidation reduction potential. More parameters may be added later. The automatically monitored data will be telemetered constantly to central recording stations.


COOK CO.
River
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WILMETTE
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2
LAKE
MICHIGAN
O'HARE FIELD
Chgo
River
Chicago River
3
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So. Br. Chgo River
CHICAGO
SANITARY & SHIP CANAL
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Calumet
Sag
Channel
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Plaines
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LOCKPORT
JOLIET
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COOK CO.
WILL CO.
ELECTRONIC WATER QUALITY MONITORING STATIONS

Figure IV

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
OFFICE

Dear Mr. Bacon:-

Please find attached the lists of the Ten Most Critical Stream Dischargers and the Ten Most Critical Sewer Dischargers. These dischargers were determined to be most critical on a pound-loading basis.

Yours very truly,
/s/ Jerome E. Stein, Ph.D.,
Director of Research and
Development

JES:bcs

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
DEPARTMENT OF RESEARCH AND CONTROL
IWC **DIVISION**

OFFICE MEMORANDUM

DATE: August 24, 1967

TO: Jerome E. Stein, Director of Research and Development

FROM: John V. Vivoda, Coordinator - Industrial Waste Control

SUBJECT: Ten Most Critical Sewer Dischargers

Name of Company	Receiving Treatment Plant	Flow GPD	Type of Violation
Armour Industrial Chem 8401 W. 47th Street McCook, Illinois	Southwest	970,000	Hexane Soluble
United Chemical Calumet City, Illinois	Calumet	450,000	Hexane Soluble Settleable Solids
International Harvester 10400 W. North Avenue Melrose Park, Illinois	Southwest	750,000	Hexane Soluble
Taylor Forge 4735 W. 14th Street Cicero, Illinois	Southwest	100,000	Hexane Soluble Settleable Solids Alkalinity
Standard Screw 2701 Washington Blvd. Bellwood, Illinois	Southwest	250,000	Hexane Soluble
Borg Warner 25th Avenue at Madison Bellwood, Illinois	Southwest	250,000	Hexane Soluble

Name of Company	Receiving Treatment Plant	Flow GPD	Type of Violation
Bliss & Laughlin 281 E. 155th Street Harvey, Illinois	Calumet	35,000	Alkalinity
Trumbull Asphalt Summit, Illinois	Southwest	20,000	Hexane Soluble
Enterprise Wire 2842 W. Vermont Blue Island, Illinois	Calumet	200,000	Hexane Soluble Settleable Solids
Motor Oils Refining 7601 W. 47th Street McCook, Illinois	Southwest	150,000	Hexane Soluble

John V Vivoda
John V. Vivoda, Coordinator
Industrial Waste Control

JVV/bcs

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
DEPARTMENT OF RESEARCH AND CONTROL
I.W.C. DIVISION

OFFICE MEMORANDUM

DATE: August 24, 1967

TO: Jerome E. Stein, Director of Research and Development

FROM: John V. Vivoda, Coordinator - Industrial Waste Control

SUBJECT: Ten Most Critical Stream Dischargers

Name of Company	Receiving Stream	Flow-GPD	Type of Discharge
United States Steel 3426 East 89th St. Chicago, Illinois	Cal. River and Cal. Harbor	440,000,000	Oil, Acids Solids, Phenols, Cyanide
Republic Steel 117th & Burley Chicago, Illinois	Cal. River	85,000,000	Oil, Acids Solids Phenols Cyanide
Wisconsin Steel 106th & Torrence Chicago, Illinois	Cal. River	70,000,000	Oils, Acids Solids Phenols Cyanide
Interlake Steel 104th & Burley Chicago, Illinois	Cal. River	33,000,000	Oil, Acids Solids Phenols Cyanide
Interlake Steel 135th & Perry Riverdale, Illinois	Cal. River	48,000,000	Oil, Acids Solids Phenols Cyanide

J.E. Stein
Page 2

Name of Company	Receiving Stream	Flow-GPD	Type of Discharge
Ford Motor Company 12600 Torrence Chicago, Illinois	Cal. River	500,000	Oil, Alkalinity Solids
Catalin Corporation 142nd & Paxton Calumet City, Ill.	Cal. River	1,700,000	Chemical (organic)
Fisher Body 79th & Willow Springs Willow Springs, Ill.	Des Plaines River	550,000	Acid, Oil Organic
Clark Oil Company 131st & Kedzie Blue Island, Ill.	Cal-Sag Channel	40,000,000	Oil Chemical (organic)
Commonwealth Edison Fisk Station 1111 Cermak Chicago, Illinois	Chicago River	709,000,000	Solids Alkalinity

John V. Vivoda, Coordinator
Industrial Waste Control

JVV/bgw

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
O F F I C E

Dear Mr. Bacon:

Please find attached summary lists of show cause hearings, from 1965 to the present, for sewer violations and stream violations respectively.

Yours very truly

/s/ Jerome E. Stein
Director of Research and Development

JES/pd

Attachments

SUMMARY OF SHOW CAUSE HEARINGS
SEWER VIOLATIONS

Name of Company	Treatment Plant Receiving Discharge	Type of Violation	Status
1966			
Proctor & Gamble 1232 W. North Avenue Chicago, Illinois	North Side Plant	Hexane Soluble	Approved January 30, 1967.
Dabrol Oil Products 6265 W. 66th Street Bedford Park, Illinois	West-Southwest Treatment Plant	Hexane Soluble Low pH	An order by the Board to cease discharge on February 2, 1967. Company went out of business.
Jero Steel Treating 7337 N. Lawndale Skokie, Illinois	North Side Plant	Cyanide	Company approved December 16, 1966.
Schiller Park, Steel 9327 Seymour Street Schiller Park, Illinois	West-Southwest Treatment Plant	High pH Hexane Soluble	Company approved July 7, 1966.
Clean Tanks 3850 S. Laramie Cicero, Illinois	West-Southwest Treatment Plant	High pH Hexane Soluble	Company went out of business February 10, 1967.
Alsip Barrel 4110 W. 123rd Street Alsip, Illinois	Calumet Plant	High pH Hexane Soluble	Company approved November 7, 1966.
Haag Industries 14000 South Seeley Blue Island, Illinois	Calumet Plant	Low pH Hexane Soluble	Company approved January 17, 1967.

SUMMARY OF SHOW CAUSE HEARINGS
SEWER VIOLATIONS

Name of Company	Treatment Plant Receiving Discharge	Type of Violation	Status
1966			
Tri-States Industrial Lab. 7438 N. Channel Road Skokie, Illinois	North Side Plant	Hexane Soluble	Company approved November 17, 1966 .
Boyle Midway 5151 West 73rd Street Chicago, Illinois	West-Southwest Treatment Plant	Low pH Hexane Soluble	Company approved January 17, 1967.
Sterling Laboratory 4600 N. Ronald Street Harwood Heights, Illinois	North Side Plant	Low pH	Order by Board to complete waste treatment facilities by October 1, 1967.
Ace Anodizing 4161 Butterfield Road Hillside, Illinois	West-Southwest Treatment Plant	Low pH	Company approved October 6, 1966.
Signode Corporation 3700 W. Lake Street Chicago, Illinois	North Side Plant	Hexane Soluble	Company approved August 1, 1966.
Standard Screw 2701 Washington Bellwood, Illinois	West-Southwest Treatment Plant	Acid Hexane Soluble	Board Order to complete facilities by October 1, 1967.
Kalmus & Associates 2424 S. 25th Avenue Broadview, Illinois	West-Southwest Treatment Plant	Acid	Company approved August 24, 1966.
El Kay Manufacturing 7224 West 60th Street Summit, Illinois	West-Southwest Treatment Plant	Hexane Soluble	Company approved February 7, 1967.

SUMMARY OF SHOW CAUSE HEARINGS
SEWER VIOLATIONS

Name of Company	Treatment Plant Receiving Discharge	Type of Violation	Status
1967			
Taylor Forge 4735 W. 14th Street Cicero, Illinois	West-Southwest Treatment Plant	Hexane Soluble High pH	Construction of treatment facilities complete. MSD reevaluating plant effluent.
Buckbee Mears Company Streamwood, Illinois	Streamwood Treatment Plant	Acid	Company went out of business
Silver Skillet 7450 N. St. Louis Avenue Skokie, Illinois	North Side Plant	Hexane Soluble	Request for a Board Order to install waste treatment facilities by November 17, 1967 or a fine will be levied.
Riverdale Plating 680 W. 134th Street Riverdale, Illinois	Calumet Plant	Cyanide	Hearing continued to November 13, 1967 for a progress report.
Trumbull Asphalt 59th and Archer Road Summit, Illinois	West-Southwest Treatment Plant	Hexane Soluble	Hearing scheduled for August 25, 1967.
Hendrickson Manufacturing 8001 West 47th Street Lyons, Illinois	West-Southwest Treatment Plant	Hexane Soluble	Hearing Scheduled for August 25, 1967.
Electro Coating 9530 Ainslee Street Schiller Park, Illinois	West-Southwest Treatment Plant	Cyanide	Hearing continued to August 28, 1967.

SUMMARY OF SHOW CAUSE HEARINGS
SEWER VIOLATIONS

Name of Company	Treatment Plant Receiving Discharge	Type of Violation	Status
1967			
DeMuth Steel 9515 Seymour Schiller Park, Illinois	West-Southwest Treatment Plant	Acid Cyanide	Company approved June 15, 1967.
Vapor Corporation 6420 W. Howard Niles, Illinois	North Side Plant	Hexane Soluble	Construction of treatment facilities complete. MSD reevaluating plant effluent.
Bliss & Laughlin 281 E 155th Street Harvey, Illinois	Calumet Plant	High pH Settleable Solids	Hearing continued to October 9, 1967.
Brightly Galvanizing 3330 S. Cicero Cicero, Illinois	West-Southwest Treatment Plant	Acid Settleable Solids	Company approved May 17, 1967.
Enterprise Wire 2842 W. Vermont Blue Island, Illinois	Calumet Plant	Acid Hexane Soluble Settleable Solids	Board Order to install waste treatment facilities by October 1, 1967 a fine will be levied.
Empire Metal 5443 W. Roosevelt Cicero, Illinois	West-Southwest Treatment Plant	Acid	Construction of treatment facilities complete. MSD reevaluating plant effluent.

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Page 1 of 2

SUMMARY OF SHOW CAUSE HEARINGS
STREAM VIOLATIONS

Company Name	Receiving Stream	Type of Violation	Status
1965			
Pielet Bros. McCook, Illinois	Summit Lyons Ditch	BOD, COD, Sus. Solids	Installed sanitary sewer, therefore eliminating stream discharge. Approved March 14, 1967
1966			
Procter & Gamble 1232 W. North Avenue Chicago, Illinois	Chicago River North Branch	BOD, COD	Diverted contaminants to city sewer. Approved January 30, 1967
Bruning Company 1800 W. Central Avenue Chicago, Illinois	Weller Creek	BOD, COD, Sus. Solids	Connection made to sanitary sewer. Approved November 22, 1966.
Lincoln Manufacturing 2617 W. Fletcher Chicago, Illinois	Chicago River North Branch	Hexane Soluble	Connection made to sanitary sewer Approved August 30, 1966.
Standard Screw 2701 Washington Blvd. Bellwood, Illinois	Addison Creek	Alkalinity Sus. Solids	Diverted contaminants to sanitary sewer. Board Order to complete by October 1, 1967.
R. G. Smith Equipment Mt. Prospect Rd. & Higgins	Higgins Ditch	Hexane Soluble BOD	Approved February 7, 1967.

SUMMARY OF SHOW CAUSE HEARINGS
STREAM VIOLATIONS

Company Name	Receiving Stream	Type of Violation	Status
1967			
Oil Storage Company 5001 Merrimac Chicago, Illinois	G. M. &O. Ditch to Sanitary & Ship Canal	Hexane Soluble	Order issued on March 3, 1967 that all discharges to ditch must cease. Construction of treatment facilities completed.
Vapor Corporation 6420 W. Howard St. Niles, Illinois	Chicago River North Branch	Hexane Soluble	MSD re-evaluating discharge.
Catalin Corporation 142nd St. & Paxton Calumet City	Calumet River	COD, Phenol	December 4, 1967 completion date set by board. Under MSD surveillance.
Columbia Yacht Club Chicago, Illinois	Lake Michigan	BOD, Sus. Solids	An order to cease and desist by September 30, 1967.
Chicago N.W. RR Proviso Yard	Silver Creek	Hexane Soluble	Show cause hearing held August 17, 1967 detailed plans must be submitted within 2 weeks.
H.M. Harper 8200 Lehigh Morton Grove, Illinois	Chicago River North Branch	Hexane Soluble	Show Cause hearing continued to September 7, 1967
Trumbull Asphalt 59th & Archer Road Summit, Illinois	Sanitary & Ship Canal	Hexane Soluble	Show Cause Hearing scheduled for August 25, 1967
UBS Chemical Lemont, Illinois	Sanitary & Ship Canal	Alkalinity, COD	Show Cause hearing scheduled for August 25, 1967.

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois, 60611 ... SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
O F F I C E

Dear Mr. Bacon:

Please find attached lists of the industries that investigations and chemical surveys have shown are in compliance with the Metropolitan Sanitary District Industrial Waste Sewer and Stream Ordinances from January 1, 1966 to the present.

Yours very truly,
/s/ Jerome E. Stein
Director of Research and Development

JES:bcs

* * * *

INDUSTRIES IN COMPLIANCE
With the
METROPOLITAN SANITARY DISTRICT SEWER ORDINANCE

Ace Anodizing and Impregnating Company

Acme Gravure Services, Inc.

Advance Transformer

J. E. Egan

Advertising Metal

Alcoa Castings

All-Brite Anodizing

Allmetals Weatherstrip

Alsip Barrel and Drum Company, Inc.

Amco Engineering Company

Anchor Metal Finishing Company

Apeco-Clayton Chemicals

Arlington Plating Company

Atols Tool and Moulding Company

Automated Plating

Baker Chemical Company

Bartlett Mfg. Company

Bell & Howell Company

Borg and Beck Corporation

Boyle-Midway Division

Brightly Galvanizing Company

Brown Packing Company

Burlington Railroad Truck Terminal

Burnham Steel and Wire

Cadillac Printing Company

Capitol Packing Company

Ceco Steel Corporation

Castle Metal Finishing

J. E. Egan

Chicago Extruded Metals

Chicago Vitrons Corporation

Cities Service Company

Clayton Mark and Company

Clorox Company

Color Warp Division of Cellu-Craft

Continental Tube Company

Courtesy Mfg.

Cronome

D & L Transport Company

Day-Nite Service

DeMuth Steel Products

Desgin Screen Printers

Diamond Blast Company

Dole Vale Company

Duer Tube Company

Enthone, Incorporator

Eskay Screw Products, Company

Farac Oil and Chemical Company

Fleet Tool Corporation

Flexonics Corporation

F and K Milk Service

Frito-Lay, Incorporated

G & W Electric Specialty

J. E. Egan

Globe Glass Mfg. Company

Hoag Laboratories

E. F. Haughton Company

Harns Hub Company

Harrison Sheet Steel Company

Fred S. Hickey Corporation

Honeywell Company

Haydock Engineering Company

Home Juice

International Refining and Manufacturing Company

Jordan Company

Jupiter Press

Kaiser Aluminum and Chemical Co.

K & W Battery

Kalums and Associates

Kelite Corporation

Koppers Company, Inc.

Kropp Forge Company

Lincoln Manufacturing Company

Lion Mfg.

Little Fuse, Inc.

London Chemical Company

Luminall Paint, Inc.

Magie Brothers Oil Company

J. E. Egan

Melco Brass Forging Company

Methode Electronics, Inc.

Midwest Brass Forging Company

Monarch Metals Company

Morton Chemicals Company

Nibot Corporation

Polyemer Company

Precision Wire Company

Premier Paint and Varnish

PreFinish Metal Company

Prenco Company of Chicago

R. C. Can & Tube

Roth Rubber Company

Royal Electric

Schiller Park Steel Treating Company

Simmons Engineering Company

Spotnails, Inc.

Snow Manufacturing Company

Stein Hall Company

Teletype Corporation

Tiletone Company

Tomco Products Company

Tri-State Industries Lubricants

Twinplex Manufacturing

Universal Screw Company

Walker Metal Company

Weber Valentine Company

Wilson Athletic Goods

Wilson Plating Company

* * *

INDUSTRIES IN COMPLIANCE
WITH THE
SANITARY DISTRICT STREAM ORDINANCE

American Sugar Company

Amphenol - Borg Company

Automatic Electric Company

Blaski Metal Products Company

Charles Bruning Company

Chicago and Eastern Illinois Railroad

Chicago Transit Authority (Forest Glen & North Park Terminals)

Chicago Union Station

Clark Oil and Refining Corporation (Chemical Plant)

Connelly, Incorporated

Demert & Dougherty, Inc.

Fitzsimmons Connell

General Mills, Incorporated

Great Lakes Carbon Company

Illinois Tube Company

J. E. Egan

J. W. Johnson Company

Joe's Fisheries, Incorporated

K. A. Steel Chemicals, Inc.

Lion Manufacturing Company

Medill Incinerator

Montgomery Ward Company

Peanut Specialty Company

Piolet Bros.

Procter and Gamble

Pure Carbonic

R. G. Smith Equipment Company

Rockwell Manufacturing Company

Spraying Systems, Incorporated

Stauffer Chemical Company

Superior Paint and Varnish Company

The Cuneo Press, Inc.

The Frederick Post Company

Village of Schiller Park

West Leyden High School

Witco Chemical Company

* * *

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
OFFICE

Dear Mr. Bacon:

Please find attached a list of the industries discharging cooling water to waterways within the boundaries of the Metropolitan Sanitary District.

Yours very truly,

/s/ Jerome E. Stein
Director of Research and
Development

JES/bgw

INDUSTRIES DISCHARGING COOLING WATER TO MSD WATERWAYS

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED
Advance Transformer 2950 North Wester	No. Br. Chi. Riv.	Cooling Water	10,000	None
American Sugar Ref. 2905 S. Western Avenue	San. & Ship Canl	Cooling Water	5,000	None
Amphenol Corporation 2801 South 25th Avenue	Addison Creek to Salt Creek to DesPlaines R.	Cooling Water	2,000	None
Armour Industrial 8201 W. 47th Street	Summit Lyons Ditch to San. and Ship Canal	Cooling Water	1,000	None
Automatic Electric 400 N. Wolf Road	Addison Creek to Salt Creek to DesPlaines R.	Cooling Water	10,000	None
Bruning Company 1800 West Central	Weller Creek to DesPlaines Riv.	Cooling Water	5,000	None
Chicago Union Station 210 South Canal Street	So. Br. Chi. Riv.	Cooling Water	20,000	None
Commonwealth Edison 3400 N. California	So. Br. Chi. Riv.	Cooling Water	107,000,000	None
Commonwealth Edison 3501 S. Pulaski	San. & Ship Canal	Cooling Water	609,000,000	None
Commonwealth Edison 4300 S. Ridgeland	Sanitary & Ship Canal	Cooling Water	609,000,000	None
Commonwealth Edison 3200 E. 100th	Calumet River	Cooling Water	134,000,000	None

8-23-67

INDUSTRIES DISCHARGING COOLING WATER TO MSD WATERWAYS

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED
Container Corp. of American 404 E. North Water Street	Chicago River	Cooling Water	107,000,000	None
Corbett, J.M., Construction Co. 2500 South Corbett Street	So. Br. Chi. Riv.	Cooling Water	500	None
Cuneo Press, Inc. 2242 South Cottage Grove	So. Br. Chi. Riv.	Cooling Water	658,000	None
Curtiss Candy Company 337 East Illinois	Chicago River	Cooling Water	10,000	None
Demert & Dougherty 5000 W. 41st. Street	Sanitary and Ship Canal	Cooling Water	10,000	None
Flexonics Corporation 300 Devon Bartlett, Illinois	Popular Creek to DuPage	Cooling Water	1,000	None
Frederick Post Seegers Rd., & N.W. Highway	Weller Creek to Des Plaines Riv.	Cooling Water	5,000	None
General Chemical 12260 S. Carondolet	Calumet River	Cooling Water	6,000,000	None
General Mills 104th & Muskegon Ave.	Calumet River	Cooling Water	30,000	None
Great Lakes Carbon 2701 E. 114th Street	Calumet River	Cooling Water	30,000	None
Henry Valve Company 3215 North Avenue, Melrose Pk	Silver Crk. to Des Plaines R.	Cooling Water	5,000	None

8-23-67

INDUSTRIES DISCHARGING COOLING WATER TO MSD WATERWAYS

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED	
Montgomery Ward 618 West Chicago	North Branch	Cooling Water	4,000,000	None	
Morton Salt Company 1357 Elston Avenue	North Branch Chicago River	Cooling Water	7,100	None	
No. American Cold Storage 345 North Canal	North Branch Chicago, Illinois	Cooling Water	1,000,000	None	
Parker Hannifin	Weller Creek to Des Plaines Riv.	Cooling Water	2,000	None	
Proctor & Gamble 1232 W. North Avenue	No. Br. Chi. Riv.	Cooling Water	18,900,000	None	
Pure Carbonic 1856 S. Lumber	So. Br. Chi. Riv.	Cooling Water	1,000,000	None	
Spraying Systems 3201 W. Randolph, Bellwood	Addison Crk. to Salt Creek to DesPlaines Riv.	Cooling Water	500	None	
Sucrest Corporation 330 E. North Water Street	Chicago River	Cooling River	2,000,000	None	
Stauffer Chemical 618 E. 138th Street	Calumet River	Cooling Water	5,000	None	
Thompson Wire 9470 W. King, Franklin Pk.	DesPlaines Riv.	Cooling Water	5,000	None	

INDUSTRIES DISCHARGING COOLING WATER TO MSD WATERWAYS

8-23-67

NAME OF INDUSTRY	RECEIVING STREAM	NATURE OF WASTES	DISCHARGE GPD	TREATMENT REQUIRED
Witco Chemical 6200 W. 51st Street	GMO Ditch San. &Ship Canal	Cooling Water	1,000	None

J. E. Egan

ILLINOIS SANITARY WATER BOARD

Rules and Regulations SWB-15

WATER QUALITY CRITERIA

Interstate Waters,

Chicago River and Calumet River Systems

* * *

AUTHORITY

Pursuant to the authority contained in Sections 1 and 6 (b) and (c) of "An Act to establish a Sanitary Water Board and to control, prevent, and abate pollution of the streams, lakes, ponds, and other surface and underground waters in the State" approved and in force July 12, 1951, (Ch. 19, ¶ 145.1 &.6, Ill. Rev. Stat. 1965), as amended by HB 1177, 75th GA, 1967, the Sanitary Water Board adopts the following Rules and Regulations:

STATEMENT OF POLICY

In the above Act it has been declared to be the public policy of this State to maintain reasonable standards of purity of the waters of the State consistent with their use for domestic and industrial water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate uses, including their use in the final distribution of the water-borne wastes of our economy. It has also been declared to be the public policy of this State to provide that no waste be discharged into any waters of the State without first being given the degree of treatment necessary to prevent the pollution of such waters.

WATER QUALITY CRITERIA

ARTICLE I

Rule 1.01. Introduction

These criteria of water quality prescribe the qualities or properties of the waters of the State which are necessary for the designated public use or benefit, and which, if the limiting conditions given are exceeded, shall be considered indicative of a polluted condition subject to abatement.

These water quality standards shall be applicable to the following interstate waters:

1. The Calumet River System. Calumet Harbor Basin -- Calumet River -- Little Calumet River -- Calumet Sag Channel.
2. The Chicago River System. North Shore Channel -- North Branch Chicago River -- Chicago River --

J. E. Egan

South Branch Chicago River -- Chicago Sanitary and Ship Canal to the confluence with the Des Plaines River near Lockport, Illinois.

"Standard Methods for the Examination of Water and Waste Water", Twelfth Edition, 1965, American Public Health Association, Inc., should be employed where applicable, but it is recognized that other approved methods may be re-required in applying some of the criteria. The Illinois Sanitary Water Board shall designate the alternate procedure in "Standard Methods", and approve any departure from these procedures, with the concurrence of the Federal Water Pollution Control Administration.

Rule 1.02 Stream Sectors and Uses

1. The Chicago River, from Lake Michigan to the confluence of the North Branch and the South Branch located west of the Franklin Street Bridge and north of the Lake Street Bridge, is the first segment of the Illinois Waterways System. It is now used and will continue to be used for commercial deep water vessel and barge shipping, for recreational use, for commercial passenger and sightseeing boat service including marinas, and for the withdrawal of industrial cooling and process waters.

These waters shall be improved to provide increased recreational use and to support fish and aquatic life. The water quality criteria included in Rule 1.03 shall apply.

2. The North Shore Channel, from Lake Michigan to the confluence with North Branch Chicago River (approximately 5100 North), and the North Branch Chicago River from the North Shore Channel to Addison Street (3600 North), are used for recreation and are receiving effluents from municipal waste treatment facilities. These waters shall be improved to provide increased recreational use and to support fish and aquatic life. The water quality criteria included in Rule 1.03 shall apply.
3. The Calumet Harbor Basin shoreward from the Breakwater and Indiana State Line, within the State of Illinois. It is now used and will continue to be used for public water supply, commercial shipping, withdrawal of industrial cooling and process water, recreation, fish and aquatic life. The water quality criteria included in Rule 1.05 shall apply.
4. The Calumet River, from Lake Michigan to the junction with the Grand Calumet River, and the Little Calumet River.

5. The Little Calumet River from the junction of the Grand Calumet River to the Calumet-Sag Channel, about 1200 W.
6. The Calumet-Sag Channel to its confluence with the Chicago Sanitary and Ship Canal west of Illinois Highway 83.
7. The North Branch Chicago River from Addison Street (3600 N.) to the junction with the Chicago River at a point west of Franklin Street Bridge.
8. The South Branch Chicago River, from the Chicago River, west of Franklin Street Bridge, to the Chicago Sanitary and Ship Canal at Damen Avenue (2000 W.).
9. The South Fork of the South Branch Chicago River from Pershing Road (39th St.) to the South Branch Chicago River.
10. The Chicago Sanitary and Ship Canal from Damen Avenue (2000 W.) to the Des Plaines River downstream from the Lock and Dam at Lockport.

Waters from Stream Sectors 4 through 10 are now used and will continue to be used for commercial vessel and barge shipping, for recreational boating transit, for withdrawal and return of industrial cooling and process water, and to receive effluents from industrial and domestic waste treatment facilities. These waters shall be improved to provide increased recreational use and to sustain fish and aquatic life.

The water quality criteria included in Rule 1.04 shall apply to waters of Sectors 4 through 10.

Rule 1.03. Stream Criteria

1. General Criteria

These General Criteria, in addition to specific criteria, shall apply to all waters at all places and at all times.

a. Free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits; or substances (coal fines, quarry fines, fly ash, limesludge, etc.) which will form bottom deposits that may be detrimental to bottom biota.

b. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious.

Oils, grease and floating solids shall be reduced to a level such that they will not create fire hazards, coat hulls of watercraft, injure fish or wildlife or their habitat, and will not adversely affect public or private recreational development or other legitimate shoreline developments or uses.

c. Free from materials attributable to municipal, industrial or other discharges producing color, odor or other conditions in such degree as to create a nuisance.

d. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to human, animal, or aquatic life.

2. Specific Criteria

These criteria are for evaluation of conditions at any point in the stream other than areas in proximity of outfalls. In such areas cognizance will be given to opportunities for the admixture of waste effluents with stream water.

a. Dissolved oxygen:

For maintenance of well-balanced fish habitats a dissolved oxygen content not less than 5.0 milligrams per liter (mg/l) during 16 hours of any 24-hour period, and not less than 3.0 mg/l at any time.

b. pH

No value less than 6.0 or greater than 9.0 at any time, and preferably between 6.5 and 8.5. Samples shall be collected away from the influence of an outfall sewer. (More than 100 feet is suggested.)

c. Temperature:

Not to exceed 90 degrees F. at any time during the months of May through November, and not to exceed 73 deg. F. at any time during the months of December to May.

d. Toxic substances:

Not to exceed one-tenth of the 48-hour median tolerance limit for fish, except that other limiting concentrations may be used in specific cases. Concentrations of the chemical constituents listed below are the maximum for any time at any point in aquatic sectors of the basin, except for areas in proximity of outfalls:

Constituent	Concentration mg/l
Ammonia Nitrogen (N)	2.5
*Arsenic	1.0
*Barium	5.0
*Cadmium	0.05
*Chromium-Hexavalent	0.05
*Chromium-Trivalen	1.00
*Copper	0.04
Cyanide	0.025
Iron	1.00
*Lead	0.1
Phenols	0.2
*Silver	0.05
*Zinc	1.00

*Heavy Metals

e. Bacteria: As determined by multiple-tube fermentation or membrane filter procedures, and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a geometric mean of

200/100 ml, nor shall more than 10% of total samples during any 30-day period exceed 400/100 ml.

(Primary contact recreation is intended to include activities in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water.)

Rule 1.04. Stream Criteria

1. General Criteria

These General Criteria, in addition to specific criteria, shall apply to all waters at all places and at all times.

a. Free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits; or substances (coal fines, quarry fines, fly ash, limesludge, etc.) which will form bottom deposits that may be detrimental to bottom biota.

b. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious.

Oils, grease and floating solids shall

be reduced to a level such that they will not create fire hazards, coat hulls of watercraft, injure fish or wildlife or their habitat, and will not adversely affect public or private recreational development or other legitimate shoreline developments or uses.

c. Free from materials attributable to municipal, industrial or other discharges producing color, odor or other conditions in such degree as to create a nuisance.

d. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations, which are toxic or harmful to human, animal, or aquatic life.

2. Specific Criteria

These criteria are applicable to stream water at any point in the river, except for areas in proximity of outfalls. In such areas cognizance will be given to opportunities for the admixture of treated effluents with stream water:

a. Dissolved Oxygen: Not less than 3.0 mg/l during 16 hours of any 24-hour period, and not less than 2.0 mg/l at any time.

b. pH: Not less than 6.0 nor greater than 9.0 at any time.

c. Temperature: Not to exceed 95 deg. F. at any time.

d. Bacteria: The fecal coliform content of secondary contact recreation waters, as determined by either multiple-tube fermentation or membrane filter techniques, shall not exceed a geometric mean of 1,000/100 ml, nor shall they equal or exceed 2,000/100 ml in more than 10% of the samples.

(This criterion is intended to provide for water uses customarily described as "secondary contact uses", including boating, fishing, and limited contact with water incident to shoreline activies; in which contact with the water is either incidental or accidental and the probability of ingesting appreciable quantities of water is minimal.)

Rule 1.05. Calumet Harbor Basin Criteria

Control Points - Calumet Harbor Breakwater at State Line. This does not exclude sampling at such other points in the Harbor area as may be necessary to insure effective monitoring and pollution control.

Coliform Bacteria - MPN/100 ml.

Annual Average (Arithmetic)	Not more than 2,000
Single Daily Value or Average	Not more than 5,000*

Fecal Streptococci - Number/100 ml Not more than 100

Turbidity

No turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of water.

True Color - Units

Annual Average	Not more than 5
Single Daily Value or Average	Not more than 15

Threshold Odor (Hydrocarbon and/or Chemical) Units

Annual Average	Not more than 8
Single Daily Value or Average	Not more than 20

Odor

No obnoxious odor of other than natural origin.

Temperature - °F	Not more than	85

Oil

Substantially free of visible floating oil.

Floating Solids and Debris

Substantially free of floating solids and debris from other than natural sources.

Bottom Deposits

Substantially free of muck and debris of other than natural origin.

pH - Units

Annual Median	Within range 8.0 - 8.5
Daily Median	Within range 7.5 - 9.0

Dissolved Oxygen - Per Cent Saturation

Annual Average	Not less than	80
Single Daily Value or Average	Not less than	65

Ammonia Nitrogen - mg/l

Annual Average	0.05
Single Daily Value or Average	0.12

Methylene Blue Active Substance - mg/l	
Annual Average	Not more than 0.10
Single Daily Value or Average	Not more than 0.30

Chlorides - mg/l	1965	1970	1980	1990	2000
Annual Average					
Not more than	16	18	20	22	24
Single Daily Value or Average	Not more than 30 (Through 1970)				

Cyanides - mg/l	
Single Value	Less than 0.1

Fluorides - mg/l	
Annual Average	Not more than 1.0
Single Daily Value or Average	Not more than 1.3

Dissolved Iron - mg/l	
Annual Average	Not more than 0.15
Single Daily Value or Average	Not more than 0.30

Phenol-like Substances - mg/l	
Annual Average	Not more than 0.002
Single Daily Value or Average	Not more than 0.005

Sulfates - mg/l	1965	1970	1980	1990	2000
Annual Average					
Not more than	35	36	39	42	45
Single Daily Value or Average					
Not more than		75 (through 1970)			

Total Phosphates - mg/l	
Annual Average	Not more than 0.05
Single Daily Value or Average	Not more than 0.10

Filterable Residue (Total Dissolved Solids-mg/l)	1965	1970	1980	1990	2000
Annual Average					
Not more than	187	190	197	204	211
Single Daily Value or Average					
Not More than		230 (through 1970)			

Miscellaneous Trace Contaminants and Radionuclides -

Shall not be present in concentrations that will prevent meeting PHS 1962 Drinking Water Standards after conventional treatment.

*Except during periods of storm water runoff when coliform should not exceed 24,000/100 ml.

Rule 1.06. Related Water Quality Criteria

The Illinois Sanitary Water Board has adopted water quality criteria for Interstate Waters -- Lake Michigan-Calumet Area, Des Plaines River, and for Intrastate Waters as follows:

1. Rules and Regulations SWB-7, Lake Michigan, Wolf Lake, Grand Calumet River and the Little Calumet River from the Illinois-Indiana line to the Calumet-Sag Channel. Calumet Harbor Basin Criteria are contained in Rule 1.05, above.
2. Rules and Regulations SWB-11, Des Plaines River from the Wisconsin border to the confluence with the Chicago Sanitary and Ship Canal.
3. Rules and Regulations SWB-14, all intrastate waters exclusive of interstate waters.

Rule 1.07. Implementation and Enforcement Plan

1. The Illinois Sanitary Water Board, under the 1951 Sanitary Water Board Act as amended (Ch. 19, Par. 145.1 - 145.18, IRS 1965), has the responsibility to control and prevent pollution in the waters of this State exclusive of the area embraced by Metropolitan Sanitary District of Greater Chicago. Authority to adopt and

enforce water quality standards within the Metropolitan Sanitary District is contained in the recently adopted HB 1177, 75th General Assembly.

2. The minimum weekly flow, which occurs once in 10 years, will be used in applying the standards. The Board plans to require compliance with the bacteriological standards for recreation during the recreational season of April through October inclusive. It is recognized that there are uncontrollable sources of bacterial pollution other than that of sewage treatment plant effluents.
3. Drastic or sudden temperature changes will not be permitted. The Board will insist upon controlled changes in temperature not to exceed 2 deg. F. per hour, nor more than a total change in 24 hours of 9 deg. F.
4. The Board collects samples bimonthly from various locations on streams in the area, and will increase the frequency within budgetary and personnel limitations. Prompt submission of monthly operational reports will be required from treatment plants in order to evaluate effluent quality.
5. The Board will require construction of municipal

treatment facilities in accordance with the following timetable:

a. Effluent chlorination facilities are to be provided at the Lemont Plant, the Calumet Plant, and the North Side Plant by the end of 1968, and at the West-Southwest Plant by July 1972. The facilities are now under construction at Calumet Plant and planned for the North Side Plant. Interim facilities are under construction at the Lemont Plant.

b. Installation of advanced waste treatment at the North Side Plant, Calumet Plant, and West-Southwest Plant may be required within the next ten years. Phosphate removal will be required as soon as practicable methods are developed.

c. The installation of sewers and sewage treatment facilities necessary to intercept and treat existing raw sewage discharges will be required within the next five years. Interception and treatment of storm overflow from combined sewers and from pump stations will be required within the next ten years.

6. Industries with inadequate waste treatment facilities will be required to provide adequate treatment for the removal of contaminants by the end of 1968.

(All industries will be required to provide a degree of treatment or control equivalent to that required of municipalities on the same reach of the stream. Except in rare instances this will be the equivalent of secondary treatment. Exceptions must be justified to the satisfaction of the Illinois Sanitary Water Board and the Federal Water Pollution Control Administration.)

7. The Board will follow Typical Project Completion Schedules listed below:
   a. Chlorination Facilities
      1) Completion of plans and specifications - 12 months before completion date.
      2) Award of construction contracts - 6 months before completion date.
   b. Treatment Works - Municipalities Less than 10,000 Population and Industries
      1) Completion of plans and specifications - 18 months before completion date.
      2) Award of construction contracts - 12 months before completion date.
   c. Treatment Works - Municipalities above 10,000 Population

1) Completion of plans and specifications - 30-33 months before completion date.
2) Award of construction contracts - 21-24 months before completion date.

8. If it appears at any time prior to the above dates that there will not be compliance with the timetables, the Board will hold administrative hearings and issue orders to submit schedule for abatement of pollution with a minimum time for completion of waste treatment facilities. When a waste producer fails to comply with an order, the Board will initiate legal action through the Attorney General for enforcement of the order in the appropriate Court.

9. It is the plan of the Board that, where needed, the control of pollution caused by combined sewer overflows, the reduction of nutrients contributed by treated sewage effluents, and the providing of tertiary treatment, shall be accomplished within the next ten years.

10. Treatment Requirements and Effluent Criteria

In order to establish a basis for treatment works design, municipal and industry representatives and consultants frequently inquire regarding the limits or effluent standards that must be met. The adoption of stream water quality criteria as required by the

Federal Water Quality Act of 1965 (PL 89-234 amendments to PL 84-660; 33 U.S.C. 466) emphasizes the need to relate stream quality to effluent quality and treatment requirements. The expressed goals established by this Act are to protect and upgrade water quality; any wastes amenable to treatment or control must receive the best practicable treatment or control prior to discharge into any interstate water. The same goals have been, and continue to be, basic under the Sanitary Water Board Act for all waters of Illinois. Both the Federal Law and the Illinois Act prohibit the use of any stream or portion thereof for the sole or principal purpose of transporting wastes.

a. All municipal or industrial facilities for treatment of deoxygenating waste shall provide at least secondary biological treatment, or advanced waste treatment, adequate to reduce the organic pollution load of the treatment works effluent at the final treatment structure in accordance with effluent guidelines in paragraph 12, below. A final treatment structure is considered the last point of access before discharge to waters of the State. Effluents shall meet all criteria expressed in

Item b below.

b. All facilities for the treatment of sewage, industrial wastes, or other wastes shall provide for the following:

1) Substantially complete removal of settleable solids.

2) Removal of all floating debris, oil, grease, scum, or sludge solids.

3) Removal of color, odor, or turbidity to below obvious levels.

4) Removal of heavy metals, or of toxic and odor-producing substances in accordance with the levels of constituents and properties listed in paragraph c below.

c. Effluents to waters of the State within the Metropolitan Sanitary District of Greater Chicago are not to exceed the following specific characteristics at any time:

Constituent or Property	Concentration Milligrams per liter
Ammonia Nitrogen	2.5
*Arsenic	1.0
*Barium	5.0

*Cadmium	0.05
*Chromium - Hexavalent (Chromate or dichromate)	0.05
*Chromium - Trivalent (Chromic or chromite)	1.0
*Copper	0.04
Cyanide - Reduced at least to cyanate and approach zero as CN	0.025
Iron (Total) - Free from color, floating or suspended iron	10.0
*Lead	0.1
Nickel	2.0
Nitrate Nitrogen	45.0
Oil - Substantially free from visible floating oil and not to exceed	15.0
pH (units)	6.0 - 10.0
Phenols	0.2
*Selenium	0.01
*Silver	0.05
Temperature and rate of discharge not to elevate stream, after reasonable admixture above 90°F, except as permitted by Rule 1.04.	
*Zinc	1.0

Dissolved solids: Not to exceed 750 mg/l as a monthly average value, nor exceed 1000 mg/l at any time. Radium-226 and Strontium-90 shall not exceed

3 and 10 pico-curies/liter respectively in the stream. In the absence of Strontium-90 and alpha emitters, the gross beta concentration shall not exceed 1000 pico-curies/liter.

* Heavy Metals.

11. Storage facilities for materials which are hazardous to health and welfare, and for oils, gases, fuels, or other materials capable of causing water pollution if accidentally discharged, shall be located so as to minimize or prevent any spillage or leakage that might result in water pollution. Structures and devices to contain spillage, such as catchment areas, relief vessels, or entrapment-dikes, should be installed at existing facilities, shall be installed at all new facilities, and shall be required following any discharge resulting in pollution.

12. Guidelines Regarding Range of Treatment

    a. Tertiary or other advanced treatment or modifications of conventional treatment will be specified for all intermittent streams and for small or low-flow streams, and shall include effluent disinfection at least through the months of May to October.

b. Permissive Treatment and Effluent Requirements

(Based on Average Strength Municipal Wastes)

Type Treatment	BOD Reduction Percent	Effluent BOD mg/1	Effluent Suspended Solids mg/1	Type Facilities	Stream Dilution Requirements
Secondary	90	20	25	*Activated Sludge	2 to 1
*(or trickling filter and supplemental treatment)					
Tertiary	95	10	13	Secondary plus Supplemental	1 to 1
Tertiary	98	4	5	Series units	Less than 1 to 1

Disinfection with up to 1 mg/1 of chlorine residual in the effluent to reduce fecal coliform to 2000 or less.

Bypass flows in excess of waste treatment works capacity shall be given at least primary treatment and chlorination in auxiliary facilities.

c. Within design limitations, operation shall be of such quality to obtain the best possible degree of treatment from all treatment works. Every effort must be made to eliminate all system bypasses and overflows, otherwise measures must be taken to provide treatment units such as lagoons, detention or holding basins, and chlorination. Installation of new combined sewers are prohibited. Existing combined sewer systems should be patrolled; overflow regulating devices shall be adjusted to convey the maximum practicable amount of combined flow to treatment facilities. Excess infiltration into the sewer system should be eliminated to keep dry weather flow within design limits of conduits and treatment works.

ARTILE II

Rule 2.01. Effective Date

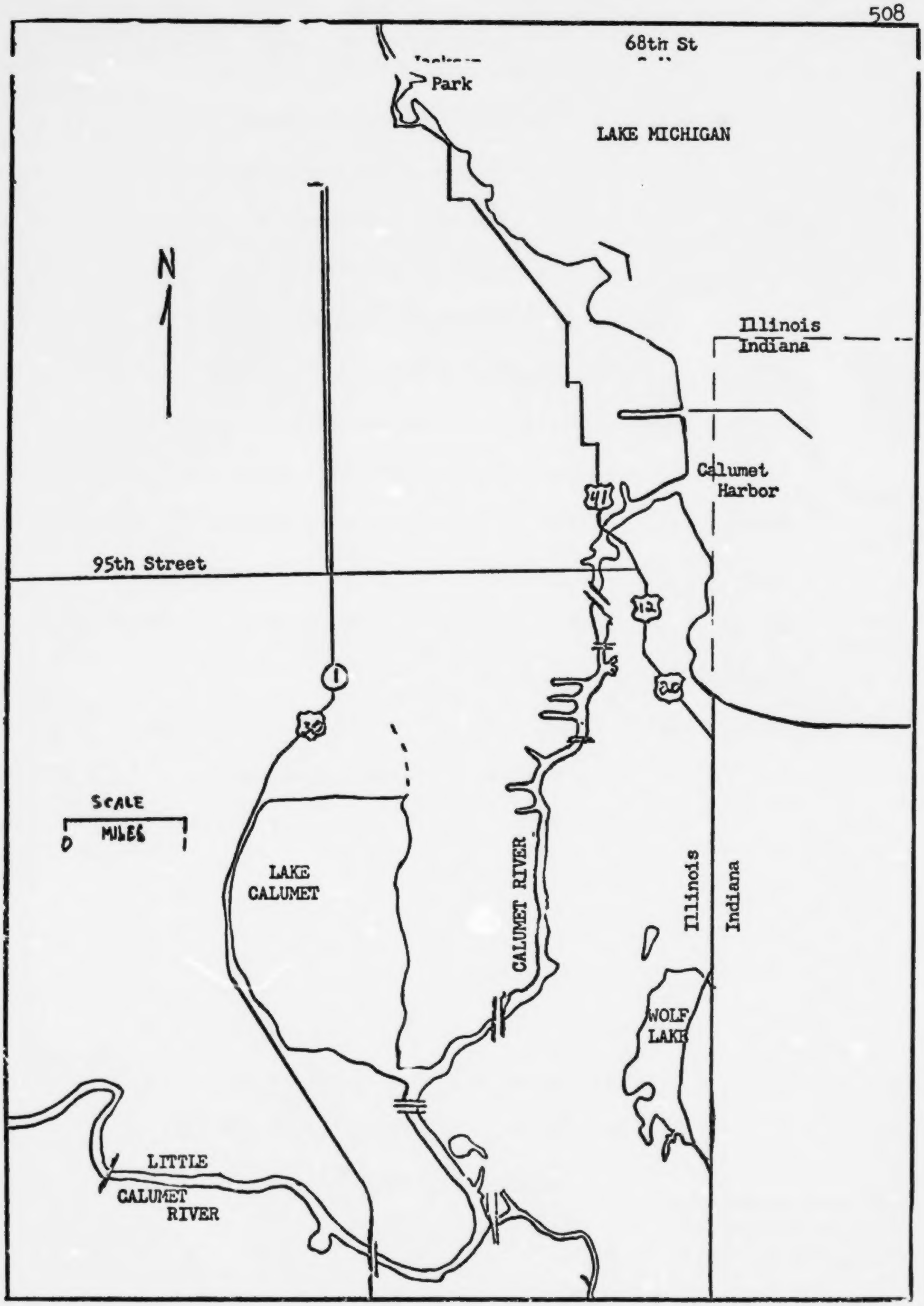
These rules and regulations establishing water quality standards shall be in full force on and after June 30, 1967.

(Seal)

/s/ Franklin D. Yoder, M.D., M.P.H.
Chairman, Sanitary Water Board
State of Illinois

Attest:
/s/ Clarence W. Klassen
Technical Secretary
Sanitary Water Board

Dated June 28, 1967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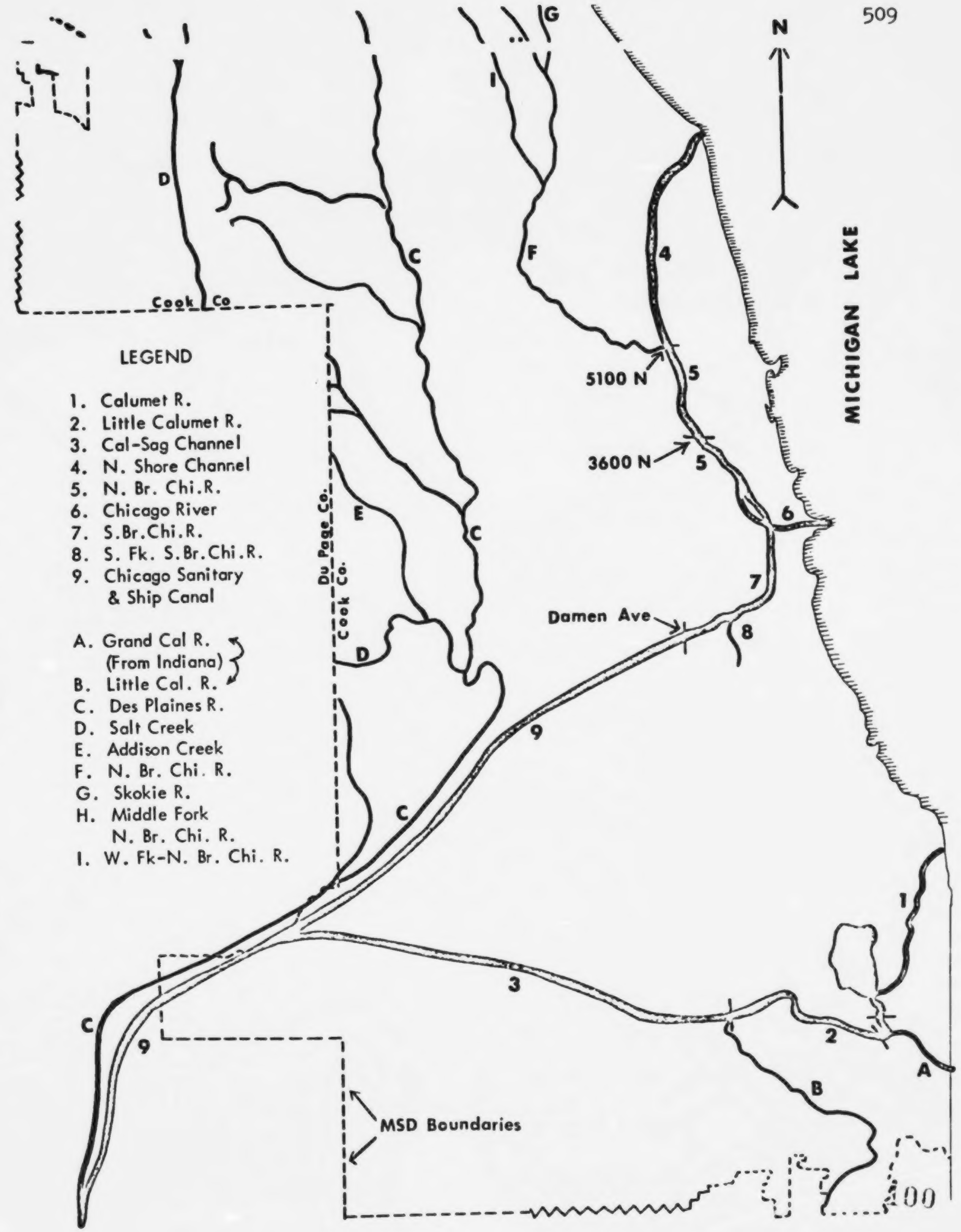
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MSD Boundaries
100
LEGEND
1. Calumet R.
2. Little Calumet R.
3. Cal-Sag Channel
4. N. Shore Channel
5. N. Br. Chi. R.
6. Chicago River
7. S.Br.Chi.R.
8. S. Fk. S.Br.Chi.R.
9. Chicago Sanitary & Ship Canal
A. Grand Cal R.
(From Indiana)
B. Little Cal. R.
C. Des Plaines R.
D. Salt Creek
E. Addison Creek
F. N. Br. Chi. R.
G. Skokie R.
H. Middle Fork N. Br. Chi. R.
I. W. Fk-N. Br. Chi. R.

J. E. Egan

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie St., Chicago, Illinois 60611 ... SUperior 7-8900

August 29, 1967

Mr. Vinton W. Bacon
General Superintendent
OFFICE

Dear Mr. Bacon:

Please find attached Compliance Schedule for industries discharging into the receiving waters within the boundaries of The Metropolitan Sanitary District.

The Compliance Schedule was designed to dovetail with the Ten Year Program formulated by The Metropolitan Sanitary District.

Yours very truly,

/s/ Jerome E. Stein
Director of Research and Development

JES/pd

* * *

COMPLIANCE AND ENFORCEMENT FOR INDUSTRIES AND PRIVATE TREATMENT PLANTS WITHIN THE BOUNDARIES OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

The Illinois Sanitary Water Board has developed water quality and effluent criteria for receiving waters within the boundaries of the Metropolitan Sanitary District. The water quality criteria are contained in a document referred to as SWB-15 and is attached. This document is to be considered as part of the compliance schedule as described herein. The Metropolitan Sanitary District (MSD) has assumed the responsibility for enhancing the water quality and enforcing compliance with the criteria set forth by the Illinois Sanitary Water Board for waters within the jurisdiction of the District. In executing the responsibilities of enhancing water quality, a five and ten year program which involves the removal of storm water from sanitary sewers, as well as the development of chlorination and tertiary facilities for all sanitary treatment plants discharging into the waterways within the limits of the Metropolitan Sanitary District. The five year goal is designed to improve water quality so that the waterways can be used for partial body contact and support a recreational fishery based on facultative or hardy species of fish. In ten years the receiving waters shall be in a condition to be used for whole-body contact sports and able to support a healthy aquatic community, including the survival and growth of obligative or pollution intolerant fish which will be supplied from hatchery stock. If these goals are to be realized, it is imperative that industries and private treatment plants coincide their waste abatement programs with that of the State Sanitary Water Board and the MSD. The purpose of this report is to establish a compliance schedule which will assure the attainment of the five and ten year goals.

COMPLIANCE SCHEDULE

By December 31, 1968

1. At the end of 1968 all dischargers shall have an active program of in-plant housekeeping. This program shall be designed to prevent the discharge of leaks and accidental spills into the waterways.
2. Debris and refuse shall be removed from the banks of waterways for the purpose of preventing these materials from being washed into or falling into the waterways.
3. Leaks and washouts from ground spills, stockpiles and storage facilities shall be prevented from entering the waterways.
4. Separation of industrial and sanitary waste for ultimate treatment, from cooling water, roof drains and storm runoff. Providing they meet effluent standards, cooling waters, drain water and storm runoff may be discharged to the receiving stream.
5. The discharge of acid and alkaline effluents shall be within the limits specified in SWB-15.

6. A program to monitor effluent quantity and quality shall be instituted. Initially the data are to be taken on a daily basis and a monthly report shall be submitted to the Metropolitan Sanitary District. The required effluent constituent to be measured will be determined by the Metropolitan Sanitary District and shall be governed by the nature of the discharge.
7. Treatment of sanitary wastes so that the effluent is equivalent to that of MSD treatment plants on the same stream.

By December 31, 1969

1. Removal from the effluent of all floating materials, oils, greases, scum and sludges.
2. Removal of settleable solids from the effluent so that no bottom deposits are formed.
3. The concentration of toxic materials in the effluent shall be low enough so that the ultimate concentration within the receiving waters shall be one-tenth of that concentration which kills fifty percent of the assay animals over a forty-eight hour period of exposure.

No Later Than 1971

All dischargers having oxygen demanding constituents in their discharge will remove constituents to a level of secondary treatment or its equivalent. The permissive treatment and effluent requirements shall be in accordance with those set forth in SWB-15 (page 13).

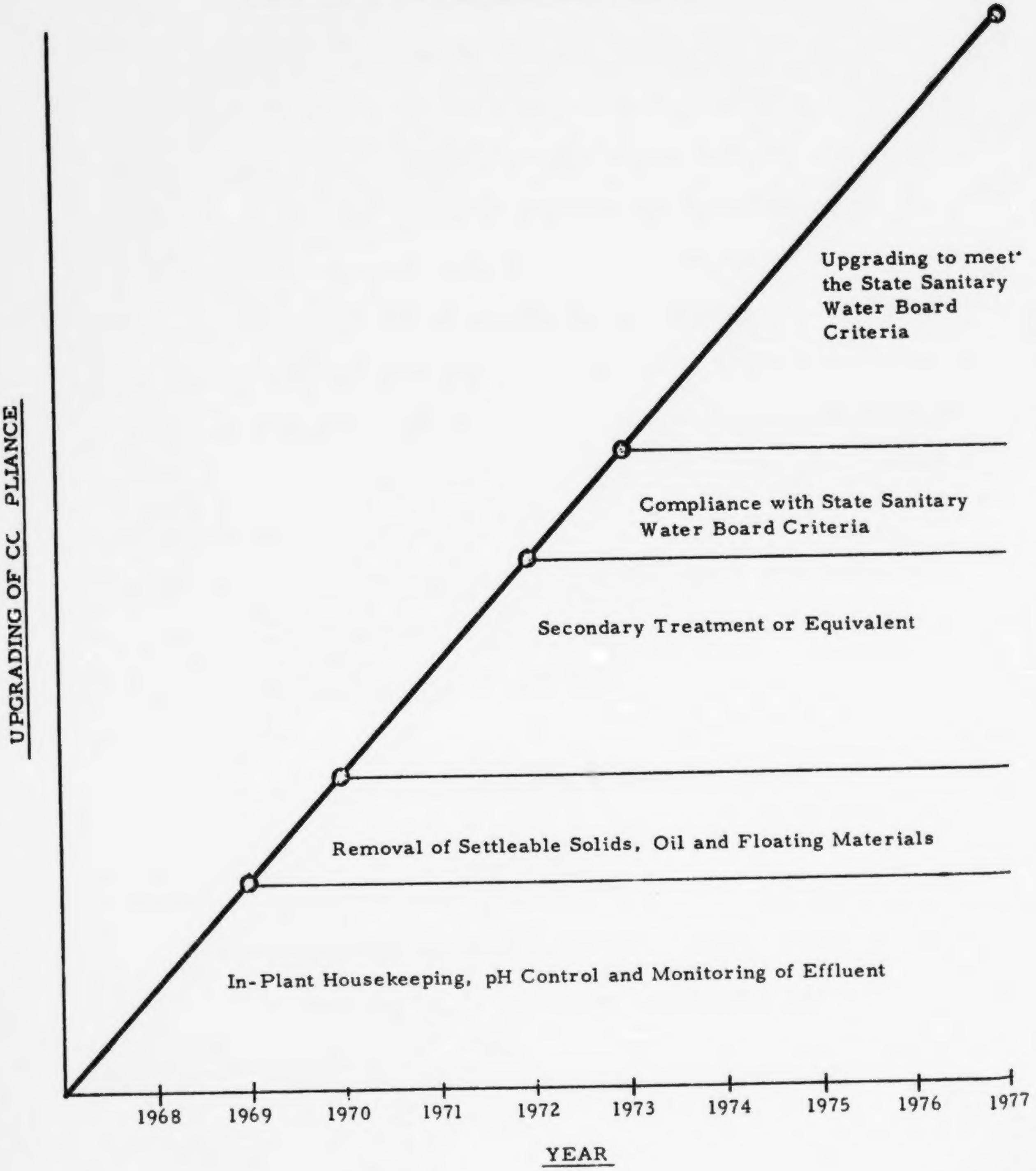
By December 31, 1972

The concentration of constituents in the effluent shall be in accordance with those concentrations set forth in SWB-15 (page 12).

From 1972 Onward

The quality of the effluents will be continuously upgraded as required so that the discharge will be equivalent to the permissive treatment and effluent requirements set forth in SWB-15 (pages 12 and 13).

SUMMARY OF COMPLIANCE SCHEDULE



J. E. Egan

RESOLUTION

REGARDING ENFORCEMENT OF WATER QUALITY CRITERIA

WHEREAS, the Illinois State Sanitary Water Board has today adopted water quality criteria and a plan for the implementation and enforcement thereof; and

WHEREAS, the Metropolitan Sanitary District of Greater Chicago has been a leader in the State, Nation, and world in protecting water resources, and has the statutory, financial, and technical competence to continue this clean waters program, and

WHEREAS, the ten-year program for water pollution abatement and clean waters as embodied in said action by the Illinois State Sanitary Water Board follows closely that which the Metropolitan Sanitary District of Greater Chicago had under consideration,

NOW, THEREFORE BE IT RESOLVED that the Board of Trustees of the Metropolitan Sanitary District of Greater Chicago goes on record as assuming responsibility for enforcement of water quality criteria as they pertain to both domestic and industrial wastes.

/s/ John E. Egan

President John E. Egan

* * * *

MR. EGAN: I will refer specifically, when I finish, to the status reports of the industries discharging to the Metropolitan Sanitary District. This will be gone into in detail by our General Superintendent, Mr. Bacon.

You will note that in only four instances no timetables have been established. In all other cases, according to the timetables established, there should be complete compliance by the end of 1968.

Although it is important to mention those who are polluting our waterways, I think in all honesty, when one industry is named as a polluter, and subsequently complies with our standards, this should also be noted. In our report to you dated March 15, 1967, the following industries were cited as violators and are now in full compliance:

General Mills, Inc.
Allied Chemical Corporation
Libby McNeal & Libby
Chicago Brick Company
Cargill, Inc.

In comment, I would say that we who are given the responsibility for the Metropolitan Area of Greater Chicago, feel that great progress has been made through our efforts in stemming the tide of pollution of Lake Michigan, for just as sure as we are sitting here, if it were not for the foresightedness of previous members of the Metropolitan Sanitary District of Greater Chicago, as well as the present ones, Lake Erie would be a "water wonderland" compared to Lake Michigan. However, we must redouble our efforts to keep all pollution out of Lake Michigan, as well as our streams and waterways. It was the Board of Trustees of the Metropolitan Sanitary District of Greater Chicago that first called attention to the U. S. Army Corps of Engineers practice of dumping polluted material into Lake Michigan, and we applaud their efforts to find other means of disposal.

We endorse Mayor Richard J. Daley's Harbor Pollution Control Ordinance. And in our own operation we have proposed, we believe, the most far-reaching program of any Sanitary District in the world.

I want to thank you and pledge to you our continued cooperation.

Now we will hear from Mr. Bacon.

MR. STEIN: Mr. Egan, which of the four companies don't have dates set?

MR. EGAN: The four are Ford, Republic Steel, United States Steel and Wisconsin Steel.

MR. STEIN: Will you or Mr. Bacon indicate why you didn't set a date for these at all?

MR. BACON: Do you want me to?

MR. EGAN: Yes.

MR. BACON: We have been working with all of them very closely. We recognize in the Sanitary District, in our opinion, that for the big dischargers this December 31, 1968, date seemed to be unrealistic and unenforceable where we could go to court on the enforcement, so we have just been working along with them getting what we think is a more realistic schedule.

We have had four or five proposals from them as to what they are going to do to get all of the wastes out of the lake, but it is so complicated that it has taken them this length of time.

We were certainly going to advocate a new date for the one discharger to the lake under our jurisdiction, namely, United States Steel, and certainly we recognize the schedule that has been proposed here as a tight one too, but since we have had about two and a half years already, which would allow a year and a half to December 31, 1968, and then another year and a half, that would be reasonable to bring about complete compliance. I am talking only about United States Steel.

MR. STEIN: All right. Let's assume that for the time.

Now, if we are talking about United States Steel, the problem is that we have the end of a 1968 date and a 1970 date that Mr. Poole and Indiana have proposed and has been accepted.

This is a fundamental question you raised. If we are to consider the delivery of a date, it is very, very difficult, and we talked about uniformity in your whole district, without getting a fairly definite date from you people, because I think it is pretty hard to figure the equities of a 1968 date and a 1970 date without having the third leg of the stool here, a date for all of the plants.

MR. BACON: You mean all of the rest of them?

MR. STEIN: I think our jurisdiction may be extended. I am not arguing this now just as to United States Steel, but obviously this will affect your whole program. You made this point before. You have to be equitable.

In order for us to be equitable to Indiana and to Illinois, the ones outside of your district, we have to consider the date that you would propose with the date that Mr. Poole is proposing, or the dates that the Federal Government or Mr. Klassen would propose, because I don't think we can arrive at a meshing of the equities on dates without having the proposal on United States Steel.

MR. BACON: I am ready to address myself to these other industries, but, for the moment, my remarks are focused upon the industry directly affected by these criteria and this timetable.

MR. STEIN: Yes.

MR. BACON: Now, the other one that I am going to speak of is going to come under the same category. The dates and standards have been set by the State of Illinois. I understand they have been accepted by the Federal Government. They too are going to get not only 1968, but 1970.

Now, that is the three of them.

MR. STEIN: Well, we may, but I think what we have to get, Mr. Bacon --

MR. BACON: We are not complaining. We can work easily with this.

MR. STEIN: Let me try to simplify this, I hope.

We have specific dates from Mr. Poole and Mr. Miller on every one of their industries. We have specific dates from Mr. Klassen on all of his operations.

I think, if we are talking in terms of the one industry, in order to arrive at an equitable solution as conferees of what is a reasonable date, we should try to be dealing with a specific date from the industry within the jurisdiction of the district.

I am not saying whether we can arrive at that, but, without it, we are going to be in a very difficult position in trying to arrive at an equitable program to affect all.

MR. BACON: If that terminal date is set, say, as of June 30, 1970, then the intermediate dates would be fixed to get there.

MR. STEIN: Yes.

MR. BACON: On this, of course, we have had proposals all the way up to five and ten years.

MR. STEIN: But are you prepared to discuss that date at this conference today?

MR. BACON: Yes, we are prepared.

MR. STEIN: Fine. Thank you.

MR. BACON: Do you want to discuss that now, or do you want to talk about the rest of our program?

MR. STEIN: No. I think we should get the rest of the program out of the way, because obviously this will be the crucial issue.

STATEMENT OF VINTON W. BACON, GENERAL
SUPERINTENDENT, THE METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO, 100 EAST ERIE
STREET, CHICAGO, ILLINOIS

V. W. Bacon

MR. BACON: Our approach to this has to be two-pronged, the one that the President has already mentioned, and in particular United States Steel; and then, of course, within the Sanitary District we not only have the discharges from the three large plants that we own and operate, but there are some 99 industries, or ten or fifteen in the Calumet and the rest of them on the other six inland waterways.

I would like to give you a report that will embody not only the Sanitary District, but industry, and then I will give you the schedule that we have for these other industries.

I will also report very briefly as to what we are doing on such matters as chlorination.

The reason that it is so important is because whatever has been imposed upon our discharge by the State, the Federal Government and ourselves, must be matched in timetables and in the quality of effluent by other industries, except this one that probably comes under the jurisdiction of the conference here.

I want to use a pointer, so I am going to stand up, with your permission.

This report that President Egan has filed with you is in four parts, and I think if you could just follow along with me on these, the first one is the progress on the Deep Tunnel Project for flood and pollution control.

As I am going to show you later, the ten-year program imposed upon us through the State water quality criteria makes it mandatory that we either provide sewer separation or the equivalent of sewer separation within a ten-year period for the main outlets.

So, this is the first big problem that we are confronted with. I am giving these to you in the order that they were presented to the Commission.

This document called the progress report on the deep **tunnel** simply says that within five years, the major features of the tunnel will be under construction, and within ten years we anticipate having the main features or the biggest ones in operation.

MR. STEIN: You know, we are going to reproduce this in black and white?

MR. BACON: That is perfectly all right.

MR. STEIN: We may have to make some adjustments.

MR. BACON: These are put up in color, and you can reproduce them from either this or our originals in black and white.

May we have Slide 1, please?

MR. STEIN: By the way, Mr. Bacon, if you make any reference to this, it would be wise for the record, I think, not to refer to a color, because when you see it in the transcript it is black and white.

MR. BACON: Thank you. I will try to remember that.

The deep tunnel plan is simply one where we provide the main underdrain deep down in the rock, and since the Sanitary District is responsible for the main drainage and the main outlet channels, the question of building these conduits or waterways so far falls within the jurisdiction and responsibility of the Sanitary District.

At the present time, the Sanitary Ship Canal is overloaded, and so is the Calumet River and Cal-Sag, the North Shore Channel and the North Branch of the Chicago River, and these surface waterway systems, in addition to being overloaded from a quantity point of view, receive these combined sewer overflows from 360 points in our system.

The plan under consideration is simply to parallel these major waterways with the tunnel some six to seven hundred feet below the rock. In other words, a second river system would be put in immediately below and all of the overflow structures would be connected directly thereto.

We have progressed in the Sanitary District through a feasibility study, and we are probably about two-thirds through a feasibility study, although some rock and seismic work which is going to have to be done for this project to go ahead will have to be done. But in essence at the present time -- and they are far advanced -- the systems would start down here in the Calumet region for the simple reason that one of the key physical facilities is a surface reservoir system indicated at this point here (indicating), from which the combined sewer waters would be brought out of the tunnel into the surface reservoir system for regulation and for treatment.

Since this study started about two or three years ago, our approach and our goals have changed also, because at the time we started out we thought that a retention in a simple reservoir for two or three days would be enough treatment before the combined waters were passed back into the canal system. But with the standards set by the State, and, as I understand it, approved by the Federal Government, we are going to have to put the equivalent of a tertiary treatment effluent back from the combined system into the canal system on the surface. So therefore, as I am going to show you very briefly, this is causing us now to have to go through a tertiary treatment right here following the reservoir.

Zone 1 simply represents the first stage of construction in this area up in here (indicating) and then second stage, and then third stage, and, of course, it is necessary to build your key features first. This would include the pump storage power, surface reservoir and all the basic structures.

They have arrived at an extremely ingenious method by grouping the system, so that regardless of whether the **stormwater** is flowing through it, or whether you are dropping the water into the tunnel for power generation, the flow is always in the same direction in the tunnel.

Next slide, please.

This (indicating) is our solution, and I think all of you have heard of this. Very briefly, this is just dropping from the overflow point into a tunnel to an underground pumping station, back into a surface reservoir, and then back into the canal system, this serving as a generating station for peaking power.

Next slide.

Here (indicating) is the great addition to our thinking, the thinking of the consulting engineers that are working on this project.

As I said, we first thought we would first drop into the tunnel, pump back up into the canal system, and be done with it. Of course, at the present time, what is happening from the existing sewer is that it is going directly into the waterway.

Under the plan, the overflows from the combined sewers would go into a tunnel, and there would be a pumping and generating station below ground, but there would also be in a portion of this tunnel, developed in greater detail elsewhere, settling and pre-treatment and pre-aeration facilities, right in the tunnel, and then coming back up to the surface, which is indicated as the upper reservoir area, where you have aeration, settling and tertiary treatment.

Again, I say that if we are going to meet the standards set by the State, that tertiary standard, we have no choice, and this is what has to be done.

Next slide.

We will skip the aquifer problem.

Next slide.

This (indicating) is probably the key chart in this No. 1 document of all if we are going to provide flood control and prevention of overflows into the lake, and also either separation or the equivalent of separation.

This was done by one of our consulting engineers, and over here he listed the Chicago land flood control plans comparison. In other words, you notice here the Metropolitan Sanitary District. We have had five plans under consideration, deep tunnel, reservoirs, the Des Plaines River plan, Delaney plan and a Meisner plan.

The City of Chicago has had three or four plans, the county has some, the State of Illinois has had a number of plans, including the present plans of canal lowering, which is represented by this line here (indicating), the Corps of Engineers has had some plans, and the Northeastern Illinois Metropolitan Planning Area Commission has had a water study and a plan also.

Our consulting engineer compared all of these plans under the objectives to be achieved -- that is, protection of Lake Michigan, reduced channel flood flows, to reduce basement flooding, and so on, reduce pollution from overflows in the combined sewers, and we just asked him to indicate, yes or no, what the project will do.

Now, if you start out with the goals of, first, protecting Lake Michigan, which is our basic business, and then, secondly, reducing flood flows in the channel, then by the time you add this reduction of pollution from overflows, you have two ingredients there that are the costly ones in this matter.

If you are going to talk about the type of plan that we are speaking of, or something else, either separation and tertiary treatment or, as we are showing you, in the deep tunnel project we can get the separation and the tertiary treatment, as well as flood control, we are not knocking anybody else's plan, but you can see what our problem is here.

Here is a project that would satisfy three of the eight objectives. The important thing to note here is that none of the other plans, except the deep tunnel, will give us a solution to the combined sewer overflow problem and will give us the chance to give improved degree of sewage treatment or produce electric power. Of course, this is just in offsetting revenue.

So, for the time being. the Board has under way extensive studies on this alternative.

I want you to note that we have had four other plans of our own also, including some extremely costly ones, such as this Meisner plan of 1958.

We do believe that in the tunnel project we have the solution and the most economical and feasible one, and it will satisfy all of the eight objectives which we thought a completed project should solve, including multiple use, such as recreation.

The feasibility study will be done. The first study was completed in May 1966. The feasibility study was completed in April of 1966, and we are also recommending certain rock boring.

V. W. Bacon

The rock boring was always in the original plan, but since we are becoming more convinced that this plan is the one to go on, we are recommending bringing forward the seismographic work.

May we have the lights on for just a couple of minutes?

The second document that President Egan has submitted to you is the thick one, and it starts out with Item No. 1, the information and data pertaining to industrial and domestic wastes.

I am not going to read it. This big document of 100-some-odd pages is summarized in three pages. I am not even going to read the summary. I would simply like to have you note what is in this summary.

Item No. 1 is the information on all the wastes to the waterways system. There are 99 direct discharges to the three rivers, the three channels, and to Lake Michigan.

Item No. 2 is a list of the ten most critical dischargers to sewers and streams, and, by way of emphasis now, you know we operate internally under two ordinances. The 1946 ordinance is what we call the Water Pollution Control Ordinance, and that controls the discharges to streams. That is the one under which we have control. The 1962 ordinance is the one that controls discharges to the sewers.

Then in Item No. 3, we have a summary list of the show cause hearings from 1965 to the present time. I would just like to read this in because it is so important in our intensified program.

You will find back in the book, on Pages 65 through 68, a list of 28 dischargers which have been cited in show cause hearings because they are in violation of the 1962 Industrial Waste Ordinance as to what can be put into the District sewerage system.

It will be noted that 13 of the companies have already installed facilities that have been approved by the Sanitary District, and that three of the companies have installed facilities which are presently being evaluated by the Sanitary District.

Then, on Pages 69 and 70, are listed the 13 dischargers. This is not just on the Calumet system now.

MR. STEIN: You don't mind if we correct the spelling of "Procter & Gamble"?

MR. BACON: Go right ahead.

These are the 13 dischargers which were cited in show cause hearings because the effluents were in violation of the 1946 ordinance, and because substantial progress towards correction was not being made at the time.

Five have already eliminated pollution in most cases by connecting to the system.

Then, in fairness, we list in Item 4 the industries in compliance with the Sewer and Stream Ordinances, and then we show that we are aware of all dischargers of pollutants. We have listed some 33 dischargers of record that are discharging cooling water to the waterways, and to make this a complete document, we have listed Regulation No. 15 of the State Sanitary Water Board.

Then, in Item No. 7, we list the compliance schedule for industries.

I would appreciate it if you would turn to Page 101. They are numbered consecutively with the red numbers, I believe, and on Page 102 you will see we have compliance and enforcement for industries and private treatment plants within the boundaries of the Metropolitan Sanitary District of Greater Chicago, and we simply note here our program of enforcement and compliance and improvement, the ten-year program as given to us by the State Sanitary Water Board, and you will see that we say the compliance must be brought about, on Page 103, by December 31, 1968. There are seven points that have to be met by that time.

Then, on Page 105, you will notice there are certain things that have to be done by December 31, 1969, and then no later than 1971, and then no later than December 31, 1972, and then from 1972 onward.

The thing to keep in mind in looking at this document is that this is completely compatible, we believe, with Regulation No. 15 of the State Sanitary Water Board for all except that single discharger which comes under the lake discharge and under the jurisdiction of the this conference.

Now, to give you just a brief word about the total program and what the Sanitary District is doing, may we have the next slide, please?

This program that I am going to present to you was adopted in policy form together with this graph on July 27th of this year by the Sanitary District.

Very briefly, it is a ten-year program and it meshes with the State Sanitary Water Board in 1967 here (indicating), 1972 here and 1977 here. This schematically or graphically represents the improved water quality.

Although I am going to be oversimplifying and not have all the qualifying statements here, the commitment is within a year or within one to four years to be on chlorination. We have listed chlorination of our major treatment facilities at the one-year point. There will be more about that later.

We have solids removal, and, in most cases, we mean here that the final work must be under construction at the time that this is started.

The solids removal does not really impinge upon the Sanitary District because of our big plant of settleable solids at the present time, the visible one, so here we are talking about industry solids removal floating and settling.

Tertiary treatment will be under way or under construction, at least, and we hope to have one big plant done, but all of them under construction at the four-year plant.

Next we have the equivalent of sewer separation, and this is the deep tunnel project, under way within five years. You will find the details in this report where our consultants state that we can have a major portion of that facility done within five years, at least, the way things are going at the present time.

Again, just graphically, if these are the present usages which they are, industrial water uses of the canal system, shipping and waste assimilation, this improvement here will probably get us to the level of very rough partial body contact with use of the water, and when the work is done by us, regardless of whether you want it or not, you are going to end up with water that is suitable for these uses shown here.

Now, here is the dilemma, and it is no longer a dilemma because it has been set in the State criteria that all of us face. There is no sense in the District going to tertiary treatment.

We define tertiary treatment as getting about nine additional percentage points of BOD and suspended solids -- in other words, going from 90 percent removal to 99 percent. There is not a reason in the world for the District to do that, and to chlorinate, and then to allow the combined sewage to overflow raw without about 5 percent of our total waste, and so, if you take it up through the tertiary, being committed to this, you are going to do the entire works if you didn't solve the combined sewer problem; so if you do this you have to do this (indicating), or if you do this you have to do this (indicating), or for a good part of the time you are maintaining a very good stream only to dirty it up thoroughly with the combined sewer overflow.

So, if these two things are done -- and you can't do them partially -- then you are going to end up with water of such a quality that downstream users and people in our area can make uses of water.

This program has been adopted by the Board as its official policy, and it is our directive to carry it out, and we are now working on financing plans. We have been working on them, but we are now doing so in greater detail.

Next slide, please.

We will skip this one.

Since we have representatives of the Federal Government here, I will very briefly state this. Figuring out the financing on the ten-year program, which is $198,000,000, this is our present State level of $22-1/2 million for construction funds per year in the Sanitary District.

Figuring on the Federal funds, the formula that the State has set up, and figuring after the first year the full appropriation, these brown portions represent what would be available from them.

At the time this was charted, we were counting on the State not to come through with its portion, and this is represented by the green, and we have the remaining financing, which you can see represents a little less than 50 percent, that would either have to be done through bonds that the District can issue, or through upping the pegged levy, and we haven't even started to explore the feasibility of Federal flood control funds for this source, or funds from a State bond election of 1968, should that pass.

We are working closely with the Department of Business and Economic Development --

MR. STEIN: What meaning does that chart have now in view of the developments both in the State and the Federal governments?

MR. BACON: Right now it means that this portion for this year is out, right there (indicating).

MR. STEIN: The State is out?

MR. BACON: The State is out, but the rest of it still holds, and this is on the basis of your present appropriation, not the authorization, but hereafter we are going to assume authorization. Otherwise, we are going to miss the schedule, and we will come back and give you people the reason.

MR. STEIN: But the point is the city funds remain stable all the time, and the Federal-State funds are supposed to go up.

Given the vagaries of government and the authorizations for the Federal funds of $450,000,000 a year, and I think the Administration has asked for a little over $200,000,000 --

MR. BACON: $203.

MR. STEIN: Yes. And the State program, if I read the papers correctly, the financial program may have had a setback.

MR. BACON: We understand that it was vetoed.

MR. STEIN: Yes.

MR. BACON: So this would mean that for this year, that little block right there (indicating), we didn't have it in 1967-68. That is out.

MR. STEIN: Do you intend that the Metropolitan Sanitary District contribution go up in the future years?

MR. BACON: This will be a policy decision for the Board, but the Board has frequently talked about the necessity of that.

Each five cents of taxation increase will raise that blue portion about $10,000,000.

MR. STEIN: What I am getting at, Mr. Bacon, and I am trying to arrive at the problem, is this: The problem I have with projections like that is that while you have an even line for the Sanitary District, and I recognize it is a policy decision for the Board, and a major one, if it goes up, that other block for the Federal Government and the State government represents equal policy decisions, and you had no trouble making those blocks.

MR. BACON: That is because you expressed it that way in Congress. We didn't make it up any more than you have expressed so far by your authorization, not your appropriation.

MR. STEIN: Mr. Bacon, you and I have been in this business for many, many years. If we had an annual budget for all the funds that were authorized by the Congress, I think we would all be surprised at the arithmetic.

An authorization does not necessarily mean that you are going to have that, and the assumption made on the State funds was on a bill that wasn't passed.

MR. BACON: Yes. Of course, there are Federal funds that have been on bills that haven't been passed either.

MR. STEIN: You are right.

MR. BACON: But, you see, Mr. Stein, when the Federal Government says after hearings and passes laws that this is necessary, then we are going to assume that they are going to catch up with this authorization business quickly.

The only justification there for keeping this at $203,000,000 this year was because the State couldn't get in gear that fast.

We happen to agree that it will be impossible -- we happen to use many, many outside consulting firms -- to get anywhere near approaching this level in 1968, and so it is only if the Federal Government says no, all of our hearings and all of our reports and all of our predictions for money that is necessary to do these jobs is not available.

When we drew this chart (indicating) we left this the same. We have already talked in budget sessions that this too would probably be going up.

MR. STEIN: Yes, because, as I read the papers, we are not doing enough.

I just received this: "Daley asks speed-up on lake pollution fight."

If we are not doing enough and we assume that the State and Federal Government have to put in more, it would seem to me that we might get consideration from the muncipalities to do more too.

MR. BACON: Well, you want to remember that the Federal and State legislation have come about because the Federal Government has said that we are not going fast enough, and in order to make it faster we are going to put more money into it. That was really the Federal Government decision, and so therefore we are going to --

MR. STEIN: Sir, I heard the Mayor of Chicago here this morning. The views that he had are no different than the Federal Government. He thinks we are not going fast enough.

If we are going to have to solve this problem, we obviously will have to solve it on a State-Federal-municipal level. We are all partners in this. If we are going to do more, perhaps we should consider that we all have to do more.

MR. BACON: Well, I would simply submit that at least for a year or two, you can see that the Sanitary District is carrying a pretty good share of the load, and has.

MR. STEIN: They always have.

MR. BACON: We recognize, Mr. Stein, the vagaries of trying to predict, but you have to start with something, and this is about our fourth effort looking at what do we have to look for.

MR. STEIN: I agree with you. That is why I wanted you to predict the dates that the industries were going to complete their treatment.

MR. BACON: We will either have to take some more blue and put it up there in the tan or the cream, or do something else if we are going to maintain the ten-year program.

MR. STEIN: Yes.

MR. BACON: Are there any other questions on this one?

(No response.)

MR. BACON: Next slide, please.

On chlorination, the Sanitary District put the North Side Sewage Treatment Plant on chlorination in 60 days, and we have put the plant on chlorination with the simple device of a $48,000 investment on two hypochlorite storage tanks. They are small tanks, only about 12 feet in height, with a feed line over here (indicating) to a meter vault, and one control panel over here in the adjacent building. This simple installation injects the chlorine water into the effluent channel, and the conduit itself is used for the contact basin, and a portion of it is used in the North Shore Channel.

This went on line on July 10, 1967. This is a year and a half ahead of the most optimistic schedule, and we have the Calumet on line by the end of this year, or a year ahead of schedule.

They gave us until 1972 to get on line in chlorination, and we anticipate that we will make this at least two or three years ahead of time if we use a portion of the canal system as a contact basin.

This is a 300,000,000 gallon per day plant. This cost us $162 per mgd chlorine capacity, while our Calumet plant is running 8,380. Ordinarily, these facilities will run around 10 to 12 to $15,000 per mgd of capacity, and in our sites we have ordinarily quite long effluent lines before we reach the receiving water, we can get about a third of it in the effluent channel itself.

In this particular case, I believe we figure it will take about 1200 feet of the channel to get our 30-minute or 20-minute detention.

We have been running bacterial tests, and the early tests are being confirmed in that this thing is working well and economically.

Our decision on sodium hypochlorite was solely on the basis of safety, and these tanks are simply fed every day by trucks from the manufacturer.

So far as the Sanitary District is concerned, we are well under way on the chlorination. We will have no difficulty meeting the standards or a timetable set by the State.

MR. STEIN: Do you have to get permission from anyone to use that channel, or is that under your jurisdiction?

MR. BACON: It is under our jurisdiction, but if you will refer back to the prior chart, eventually we dedicate this water to recreation, and there is going to be a question of whether you then put contact basins on the plant site, or whether we dedicate 1200 feet as a restricted area.

MR. STEIN: All right. When you get it in here, are you going to have enough flow to get it out?

MR. BACON: Now, the flow is one to one. In other words, during the critical season of the year, Lake Michigan would be back here (indicating). The water from the lake comes to the pumping station, and we have a ratio of one dilution to one effluent.

Of course, this is another reason why it was put on an experimental basis to begin with, because we wanted to know the chlorine demand of the water and the pickup of the water along the way.

MR. STEIN: These are just information questions.

MR. BACON: We are putting this here so that you will know what we are doing, and how this dovetails with our industry program, because if we don't practice chlorination before a certain time, we cannot ask them.

Let me say that it is not out of the goodness of our hearts that we are ahead of schedule.

Next slide.

On tertiary treatment, we indicated on the one chart that we expected to have a big plant, Calumet or North Side, under way by 1971.

In order to get ready for that at our Hanover Plant, this plant here (indicating), which has been in operation for three years, is a 2,000,000 gallon per day plant and we are adding the tertiary structure here(indicating). This building is 72 feet wide by 240 feet long, full basement or substructure, and one story above.

We already have four large polishing ponds over here (indicating) that we could use and we still use for stormwater overflow.

We have our sludge lagoons over here (indicating) from which the digest is discharged.

Now, the question was what kind of tertiary treatment are we thinking of, and this is why I asked Mr. Poole, or Mr. Miller, rather, what they were thinking of in terms of tertiary.

As far as we are concerned, tertiary means getting the rest of the BOD and practically all of the rest of the suspended solids. Our basic design criteria did not include removal of nitrates and phosphates, because we are not going into a still body of water. We are going into a moving stream, even though this little stream here much of the time is practically all effluent, but this plant is nothing but a rapid sand filtration plant with chemical coagulation, settling, continuous backwash sand filters, post-chlorination and post-aeration, the same size as the sewage treatment plant, 2,000,000 gallons per day.

MR. STEIN: Mr. Bacon, would you mind if I interrupted here and went off the record for just a second?

(Discussion off the record.)

MR. STEIN: Thank you, Mr. Bacon.

MR. BACON: This plant is two-thirds constructed. This is not a dream. There is $1,126,000 worth of plant and it is under construction.

The additional important features here are that although we did not make phosphate removal a design criterion, we nevertheless can vary the chemical treatment in any way we want, alum, polyelectrolite, lime, because we are well aware of the work that says 95 percent of the phosphates can be removed with lime.

If we happen to get the happy finding that lime is just what we want to coagulate and we knock down the phosphates at the same time, we have made progress, but it was not the controlling feature at the time.

Now, one-sixth of this building, this whole panel down here (indicating) is left open for experimental work on a large scale, because we can then scale up to a 300,000,000 gallons a day, or a billion gallons per day plant.

Right in this portion of the system (indicating) we have a one million gallon per day microstrainer, and, of course, when you realize this building is 72 feet wide and 240 feet long, and this strainer fits in there, and it is 12 feet in diameter and it is half the capacity of the plant, you will see that this is satisfactory for the time being for tertiary treatment, so, therefore, we may use microstrainers at the bigger plants for a few years.

This plant will be in operation shortly after the first of the year, and from it we anticipate we will be able to scale up for the tertiary treatment.

Next slide, please.

This (indicating) is just simply the inside of that plant.

By the way, that was an architectural drawing, but the plant will look just exactly like you have seen because the artist's renderings were made after the engineer's drawings.

Inside there will be the circular chemical coagulation and settling tank and the rapid sand filter. It is built with extreme versatility so we can load to any degree we want to, with the microstrainer over here (indicating), chlorination and post-aeration.

The design here is when the effluent leaves this plant, there will be no BOD, no oxygen requirements, which will not be satisfied.

Next slide, please.

The last thing now we will talk about will be the monitoring systems and what we should do.

V. W. Bacon

We have under contract now -- I think it is about $95,000 -- the structures for the monitoring stations. In fact, last Saturday with the League of Women Voters on a boat trip, they saw one of them here on the Corps of Engineers at the O'Brien Lock, a very substantial brick building where one of these stations will be located.

So, under one contract, we have about $95,000 worth of housing being placed in, and on another contract for $304,000, all of the equipment, the eight parameter sampling -- that is, sampling, analyzing, recording and telemetering devices will go in at three points along the lake, at Wilmette at the mouth of the Chicago River, and at the filtration plant, and then we will have three control plants at our treatment plant which will measure the effluent as well as the stormwater at North Side, Stickney and Calumet, and they will meet on the system here at the confluence of the North Branch with the Chicago River, one here at O'Brien, one here at Willow Springs, one here at Cal-Sag just before the junction, and one at Lockport.

So we have under contract both features of the eleven stations monitoring program on our inland waterways, and all of the stations such as Lockport and Willow Springs and Cal-Sag that affect this plant here at Stickney will also telemeter in and record at Stickney, so that the operation here can be varied along this system. Calumet will receive the results of this system here and North Side this system here (indicating), while all of them will telemeter into the central station, where we hope to be able to make good use of the data.

Next slide, please.

Lastly now, and this is kind of far out, but I do want to mention it, this is just one phase of our recent program (indicating).

We do have two contracts now on the potential use of radiation in the treatment processes. Both of them are based somewhat upon the same principal of using spent fuel cells, exposing wherever we want to expose to gamma radiation, and some form of the U Tube. Purdue is working on the conditioning, the stabilization and the concentration of solids and sludge.

Everybody has difficulty with activated sludge getting into it in a concentrated enough form so that you don't have to build tanks and pipes and so forth to handle a lot of water. Purdue is working on the solids stage. Bethel will be working upon the treatment or destruction of phenols, cyanides, bacteria and viruses, and petroleum type of chemicals for treatment.

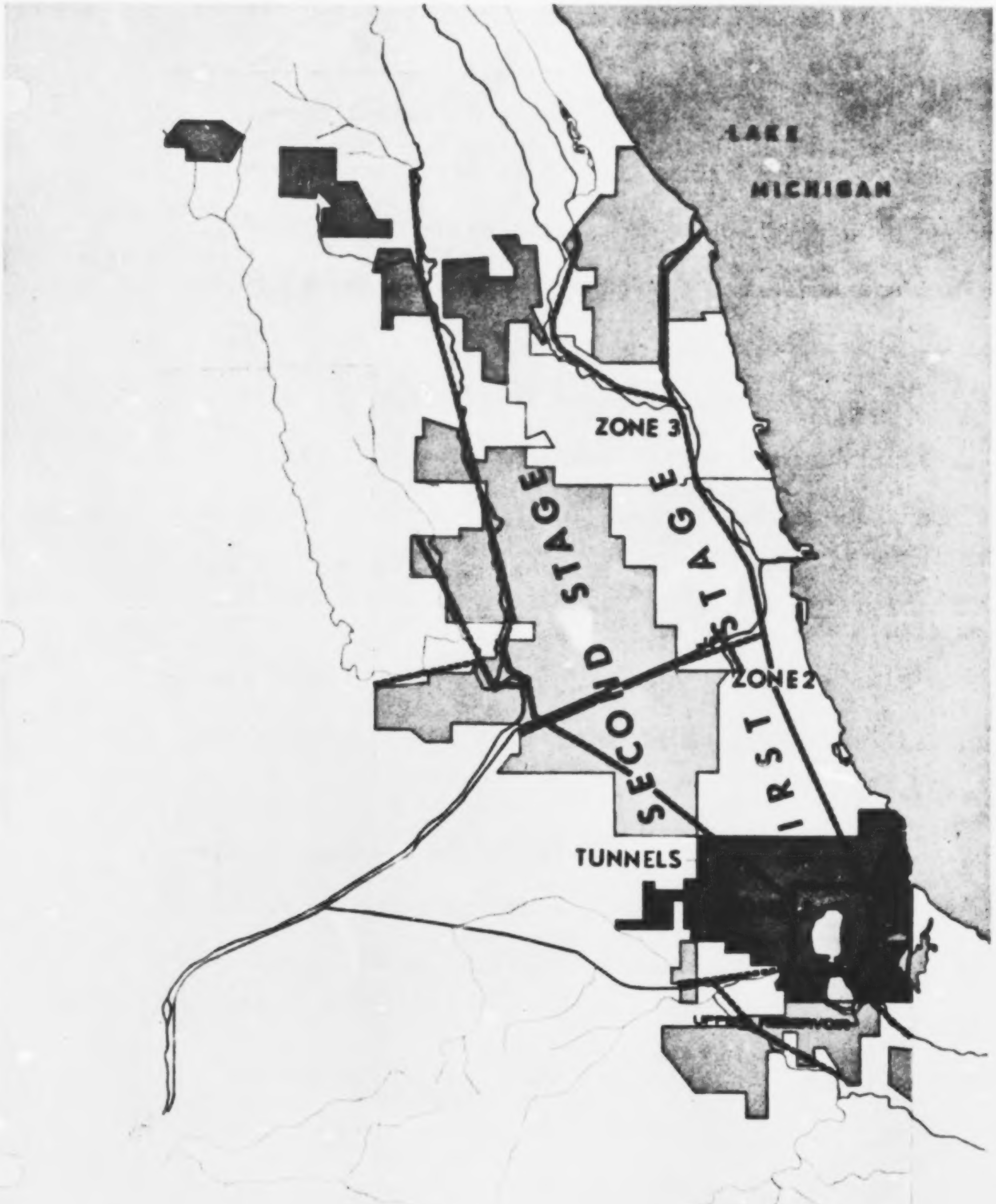
We have another phase of this that we have not been able to consummate yet. Assuming these processes are successful, and we have every reason to believe that they will be, then we have to start work on developing the equipment, the systems and so forth, for putting together the emitting material and the material to be treated, and we have tried to write a contract with the Oregon Laboratory, but they cannot take private or public funds on a contract basis, so we have been looking elsewhere. In the meantime, Oregon may have been able to work out something so that we can put the contract with them.

Now, by way of summary, we have a ten-year program. That ten-year program intends to carry the upgrading of the water all the way.

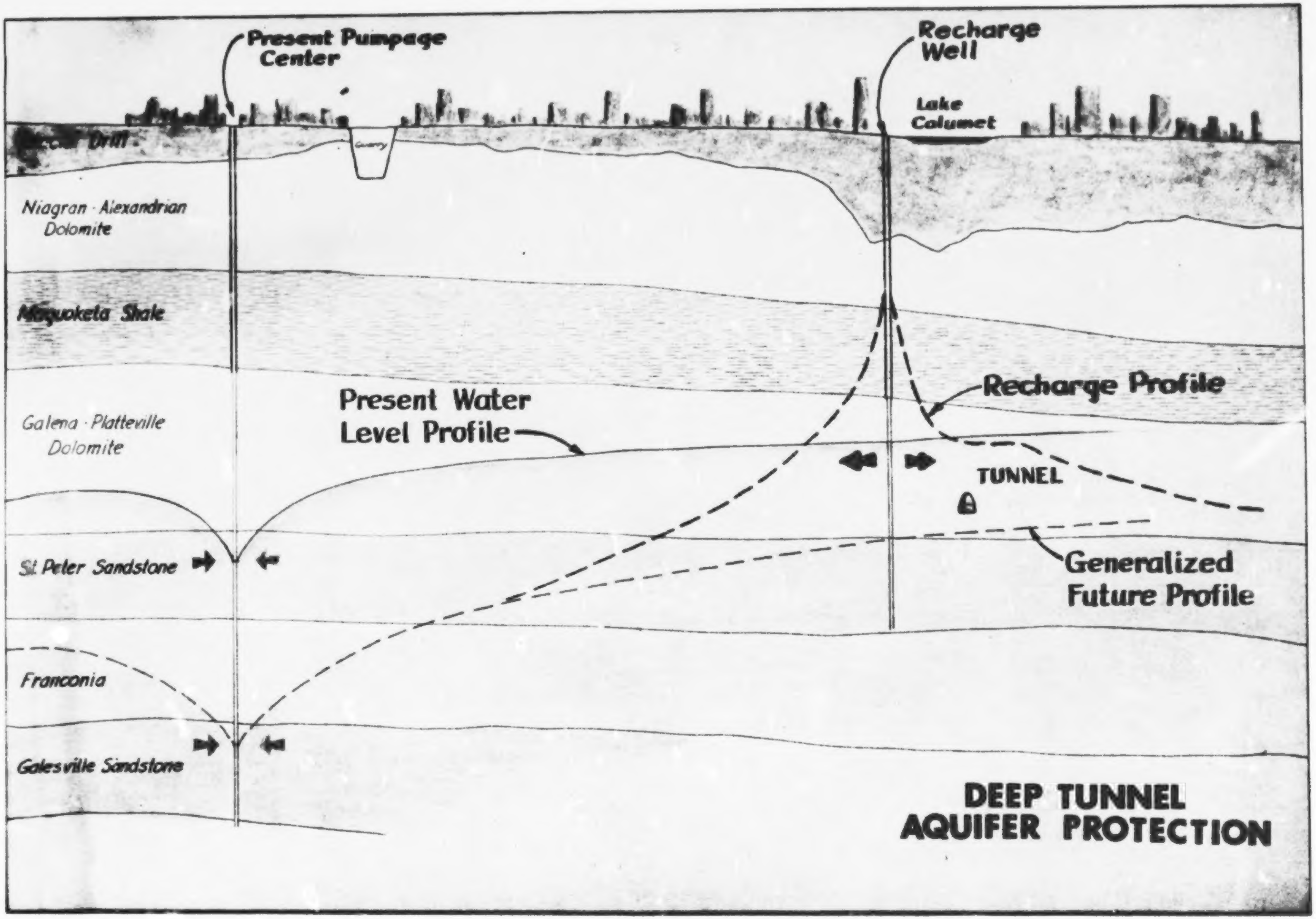
The industry program referred to on Pages 101 to 107 or 108, whatever it is, is intended to match that program in every respect, giving them as much time as we expect that we ourselves shall have.

But there is one thing that bothers us now and which I would like to submit to the conference, just by way of studying the thought process, but it is something that is going to have to be reconciled shortly.

You see, we have from the State and the Federal Government, assuming the Federal Government approves the State standards, a ten-year program, and that ten-year



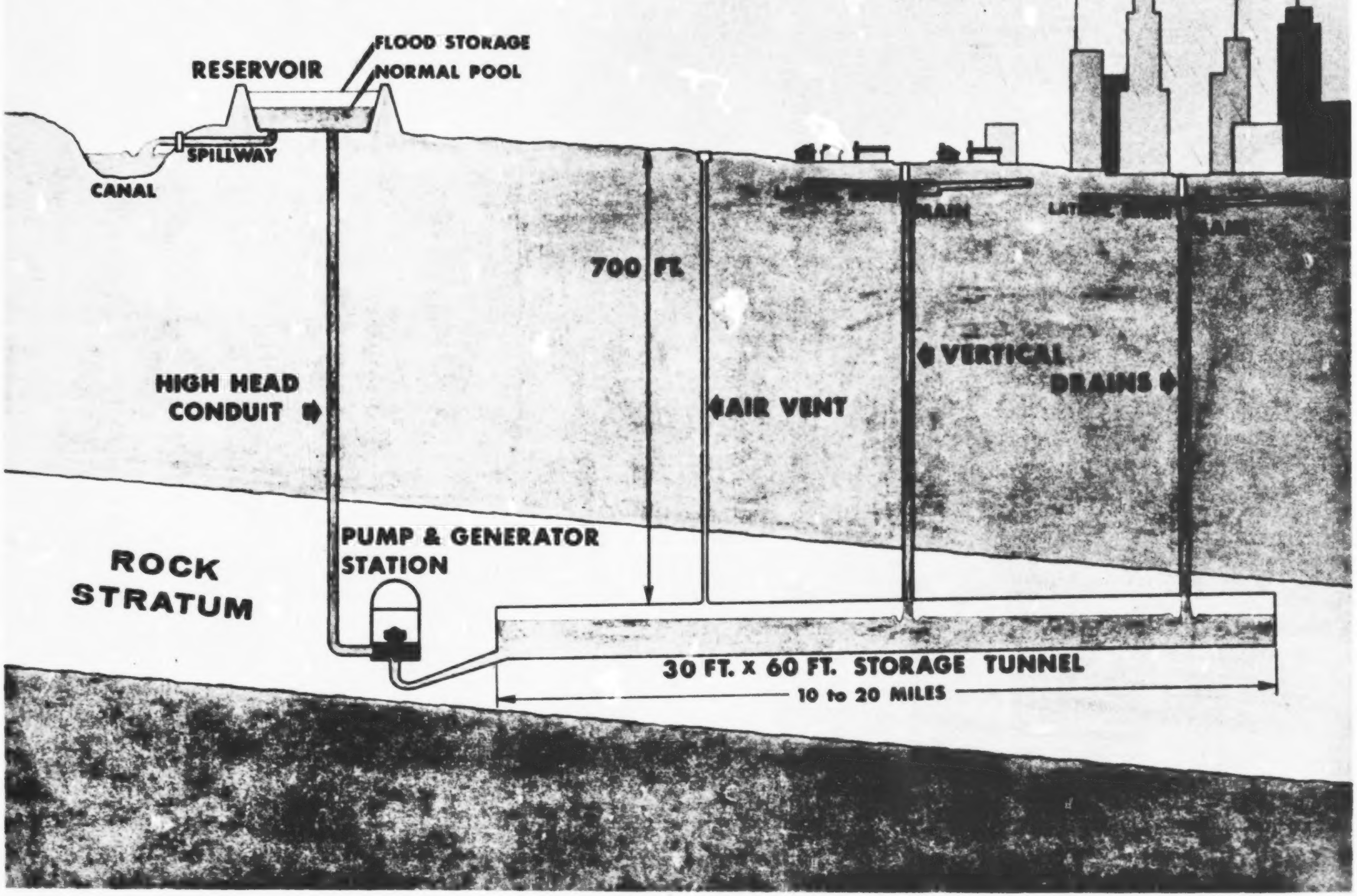
CHICAGOLAND DEEP TUNNEL PLAN FOR
FLOOD AND POLLUTION CONTROL



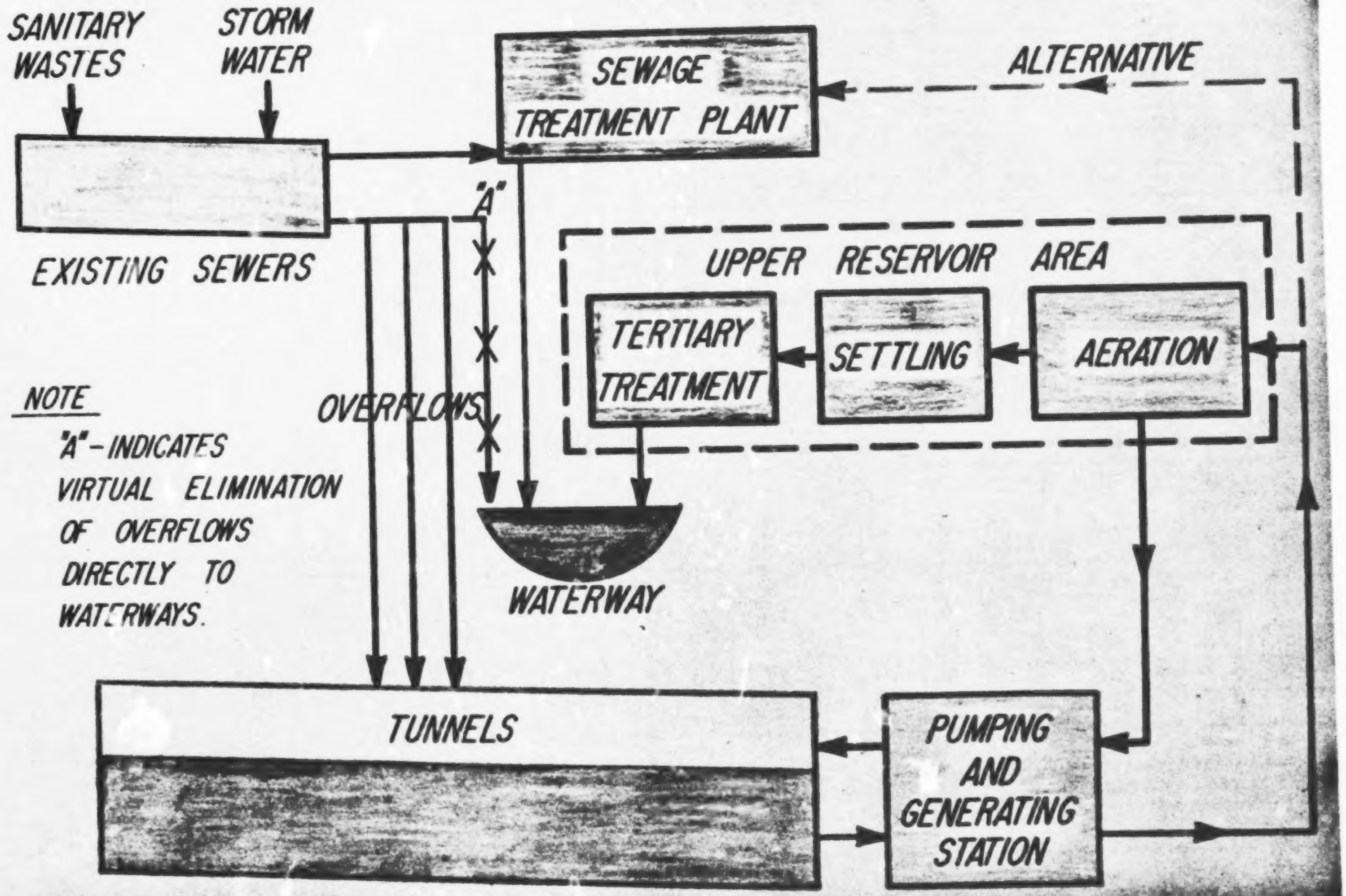
DEEP TUNNEL
AQUIFER PROTECTION

FLOOD RELIEF PROJECT

UNDERGROUND STORM DRAINAGE



CHICAGO DEEP TUNNEL SYSTEM



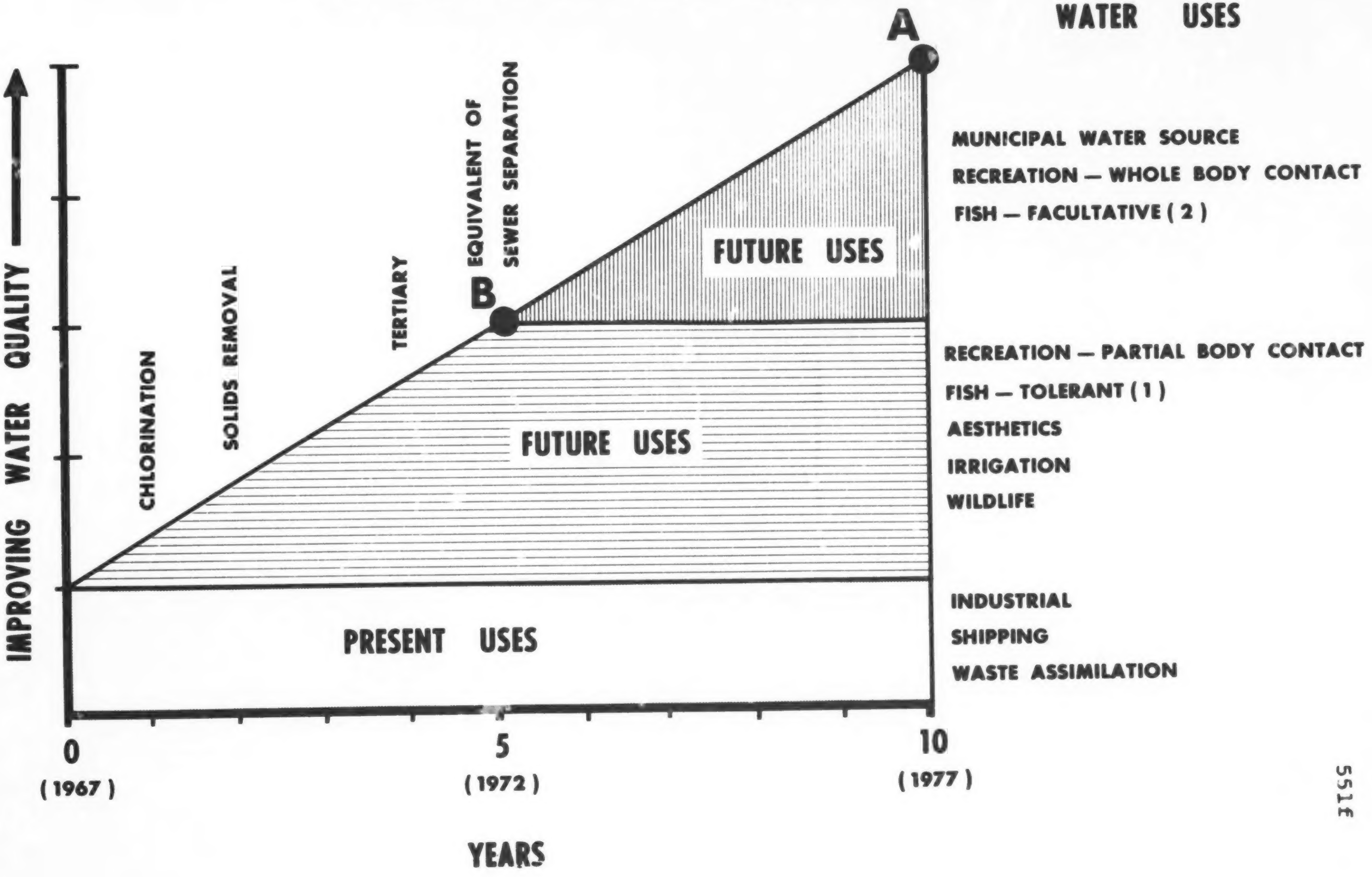
NOTE
"A"-INDICATES VIRTUAL ELIMINATION OF OVERFLOWS DIRECTLY TO WATERWAYS.

CHICAGOLAND FLOOD CONTROL PLANS COMPARISON					OBJECTIVES ACHIEVED							
AGENCY	PLAN	DATE OF PUBLICATION	NATURE OF PLAN	ESTIMATED COST IN $ MILLIONS	PROTECT LAKE MICHIGAN	REDUCE CHANNEL FLOOD FLOWS	REDUCE BASEMENT FLOODING	REDUCE POLLUTION FROM OVERFLOWS	IMPROVE DEGREE OF SEWAGE TREATMENT	INCREASE RECREATION USES	PRODUCE ELECTRIC POWER	PROVIDE OTHER BENEFITS
METRO SAN DIST	DEEP TUNNEL	1966	STORAGE & TREATMENT	87 TO 600+	YES	YES	YES	YES	YES	YES	YES	YES
	RESERVOIRS	1964	FLOOD STORAGE	25	SOME	YES	NO	NO	NO	YES	NO	NO
	DES PLAINES R.	1960	LOWER CHANNEL	70	YES	NO	NO	NO	NO	NO	NO	YES
	RAMEY PLAN	1958	BIGGER CHANNELS	100	YES	NO	NO	NO	NO	NO	NO	NO
	MEISSNER PLAN	1958	RESERVOIRS & CHANNELS	200±	YES	NO	NO	NO	NO	YES	NO	NO
CITY OF CHICAGO	AUXILIARY RELIEF SEWERS	STARTED 1947	MORE SEWERS	300+	NO	NO	YES	NO	NO	NO	NO	NO
	O'HARE RESERVOIR	1959	EXAMPLE OF RUNOFF STORAGE		NO	YES	NO	NO	NO	NO	NO	YES
	CALUMET AREA	1965	SEWERS AND PUMPING STATION	62	SOME	NO	YES	NO	NO	NO	NO	NO
COOK COUNTY	DES PLAINES R.	1959	RESERVOIR	3	NO	YES	NO	NO	NO	YES	NO	YES
	SALT CREEK	1959	RESERVOIR	3	NO	YES	NO	NO	NO	YES	NO	YES
	OTHER STREAMS		RESERVOIR		SOME	YES	NO	NO	NO	YES	NO	YES
STATE OF ILLINOIS	CANAL LOWERING	1966	LOWER CHANNEL	600	YES	NO	NO	NO	NO	NO	NO	NO
	DU PAGE RIVER	1966	RESERVOIR		NO	YES	NO	NO	NO	YES	NO	NO
	DES PLAINES R.	1962	RESERVOIR & CHANNEL	30	NO	NO	NO	NO	NO	YES	NO	NO
	FOX RIVER		RESERVOIR & CHANNEL		NO	YES	NO	NO	NO	YES	NO	NO
	OTHER STREAMS		BIGGER CHANNEL		NO	NO	NO	NO	NO	NO	NO	NO
CORPS OF ENG'RS	CALUMET UNION DITCH	STARTED 1954	BIGGER CHANNELS	2.5	NO	NO	YES	NO	NO	NO	NO	NO
	CAL. SAG. CHANNEL	67% COMPLETE STARTED 1946	NAVIGATION CHANNEL	INCLUDED IN ILL. WATERWAY	YES	NO	NO	NO	NO	NO	NO	NO
	ILLINOIS WATERWAY	95% COMPLETE STARTED 1927	NAVIGATION PROJECT	330	YES	NO	NO	NO	NO	NO	NO	NO
	FOX RIVER	STARTED 1960	STUDY ONLY									
	LITTLE CAL. RIVER	STARTED 1961	STUDY ONLY									
NIPC	WATER STUDY	1966	WATER RESOURCE MANAGEMENT		NO	YES	NO	NO	NO	YES	NO	YES

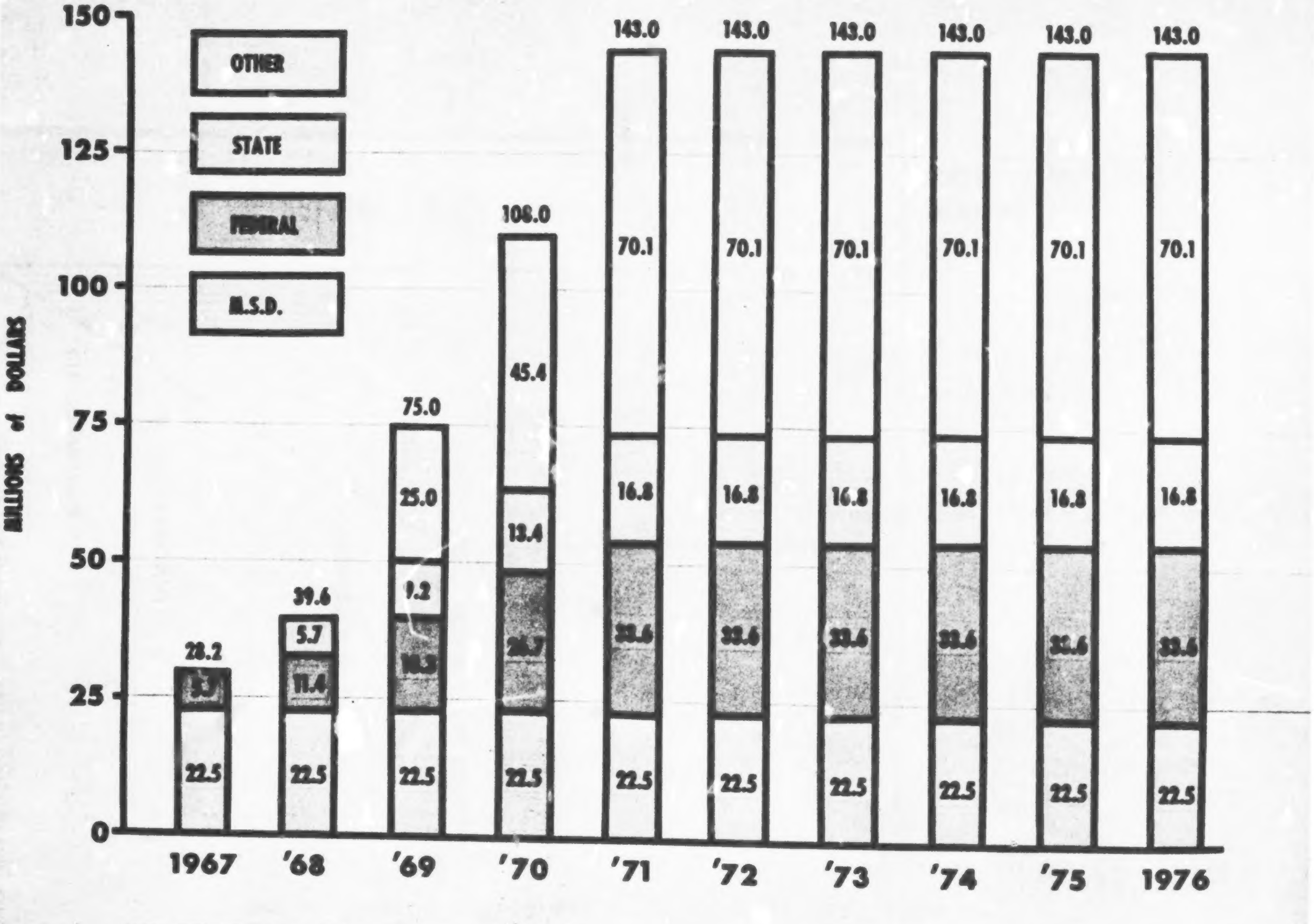
BAUER ENGINEERING, INC.

GRAPHIC UPGRADING OF INLAND WATERWAYS

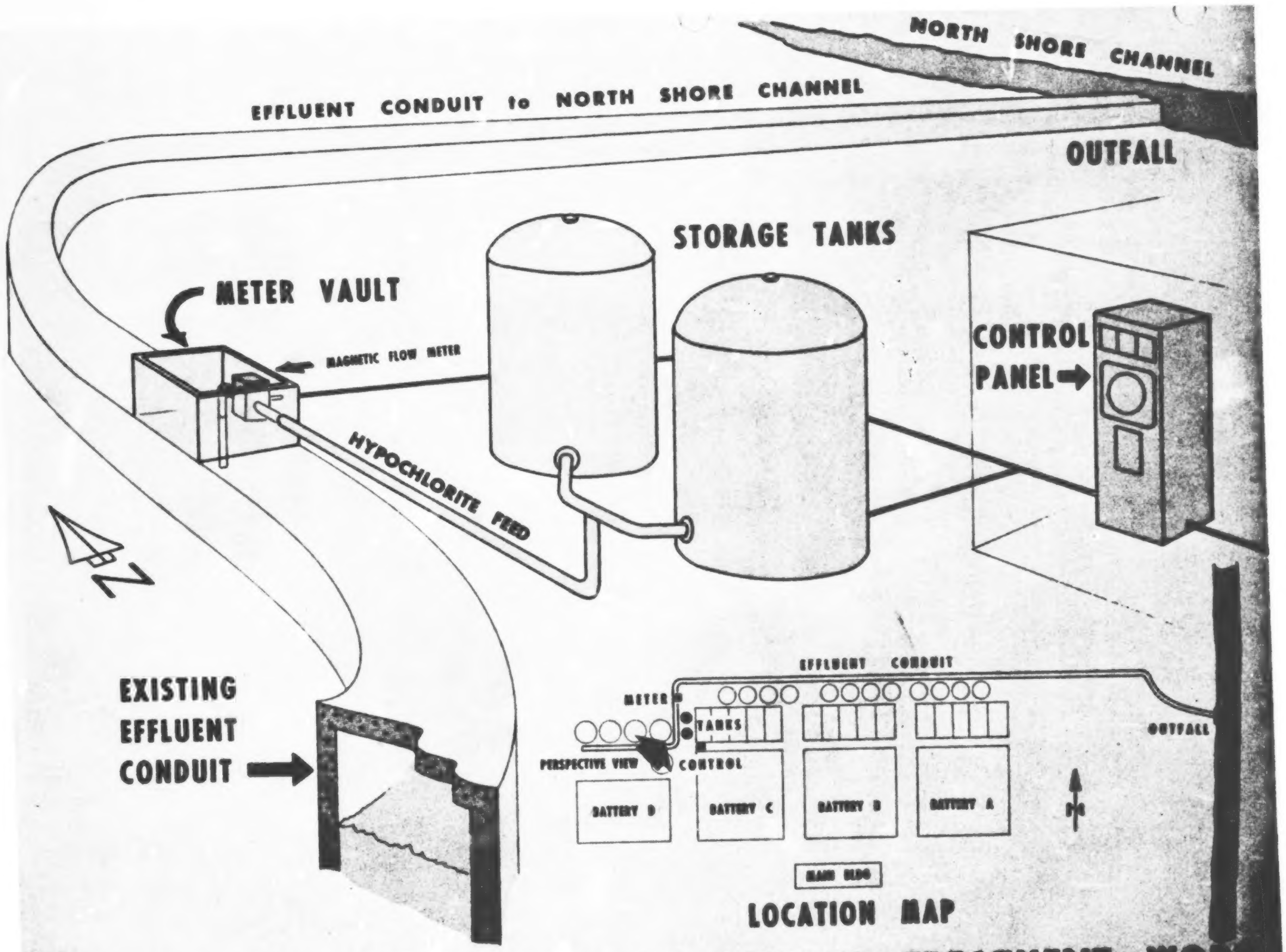
THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO



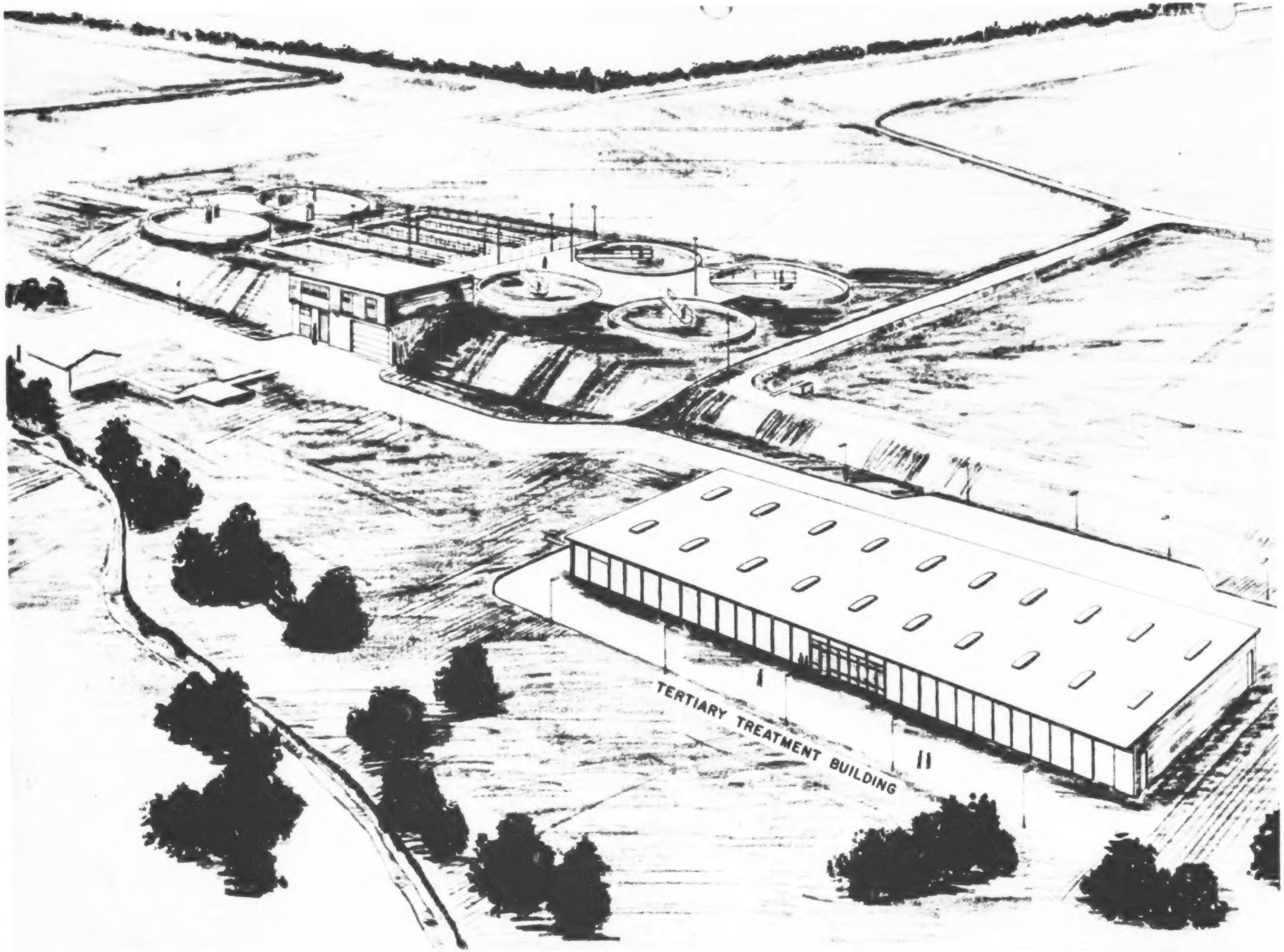
10 - YEAR ACCELERATED CLEAN - UP PROGRAM CONSTRUCTION EXPENDITURES



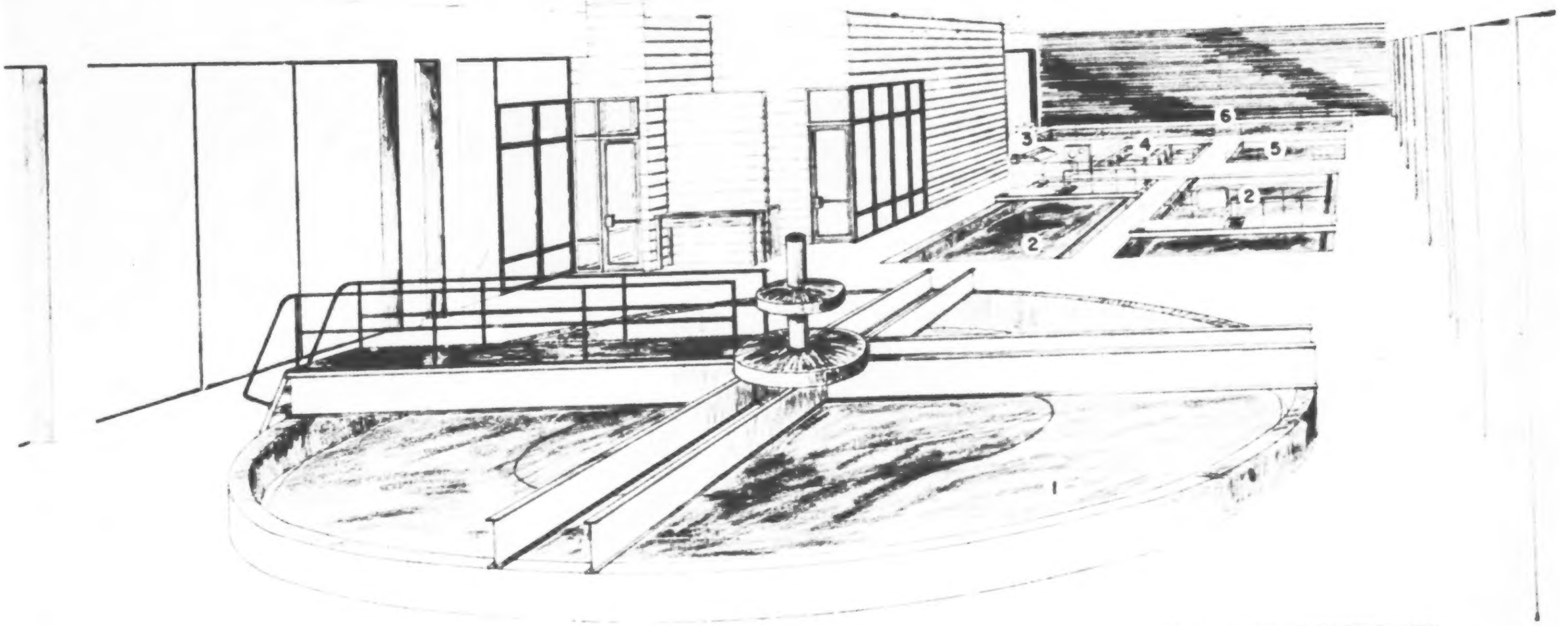
NOTE: FULL FEDERAL & STATE AUTHORIZATION ASSUMED



CHLORINATION AT NORTH SIDE SEWAGE TREATMENT WOR

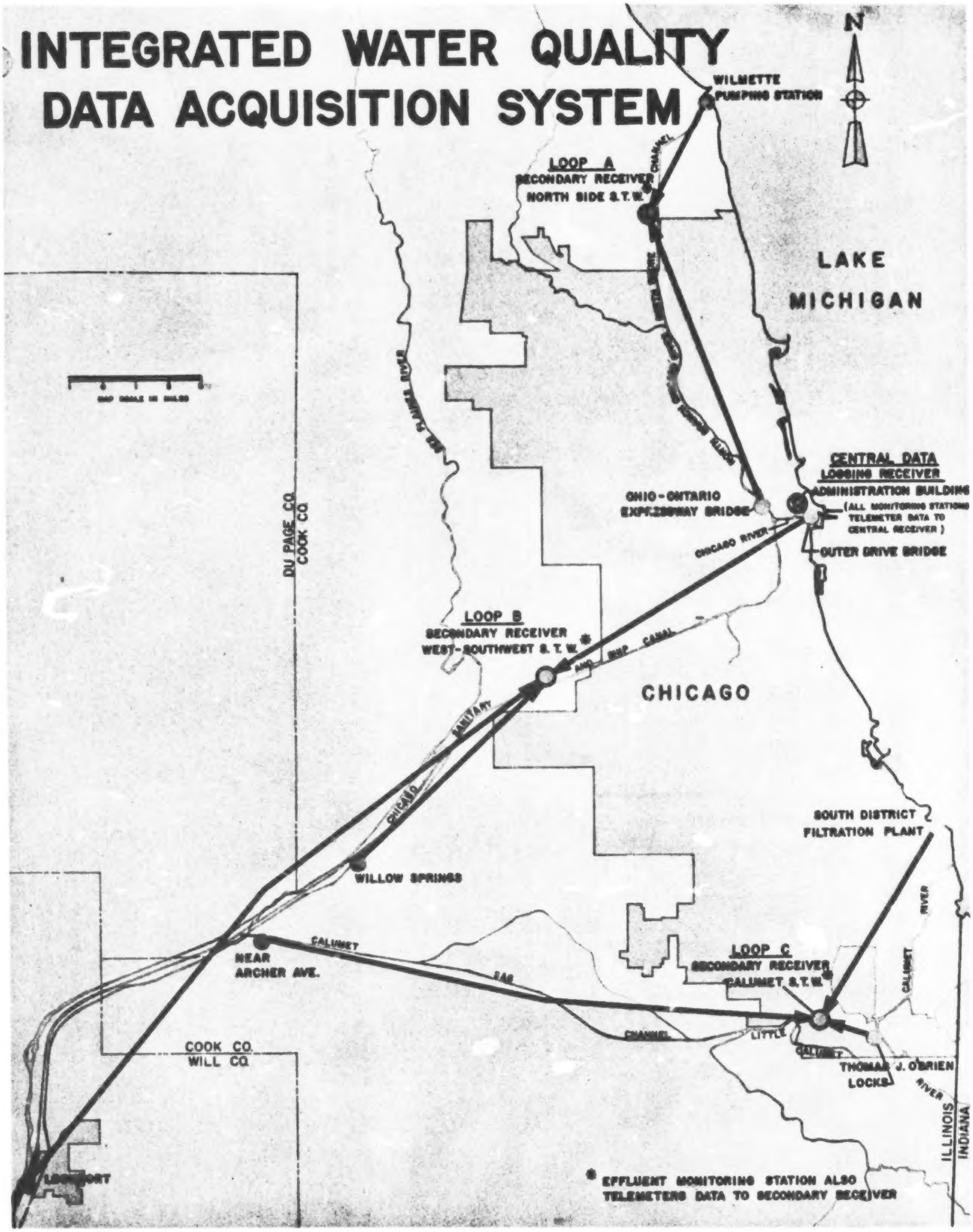


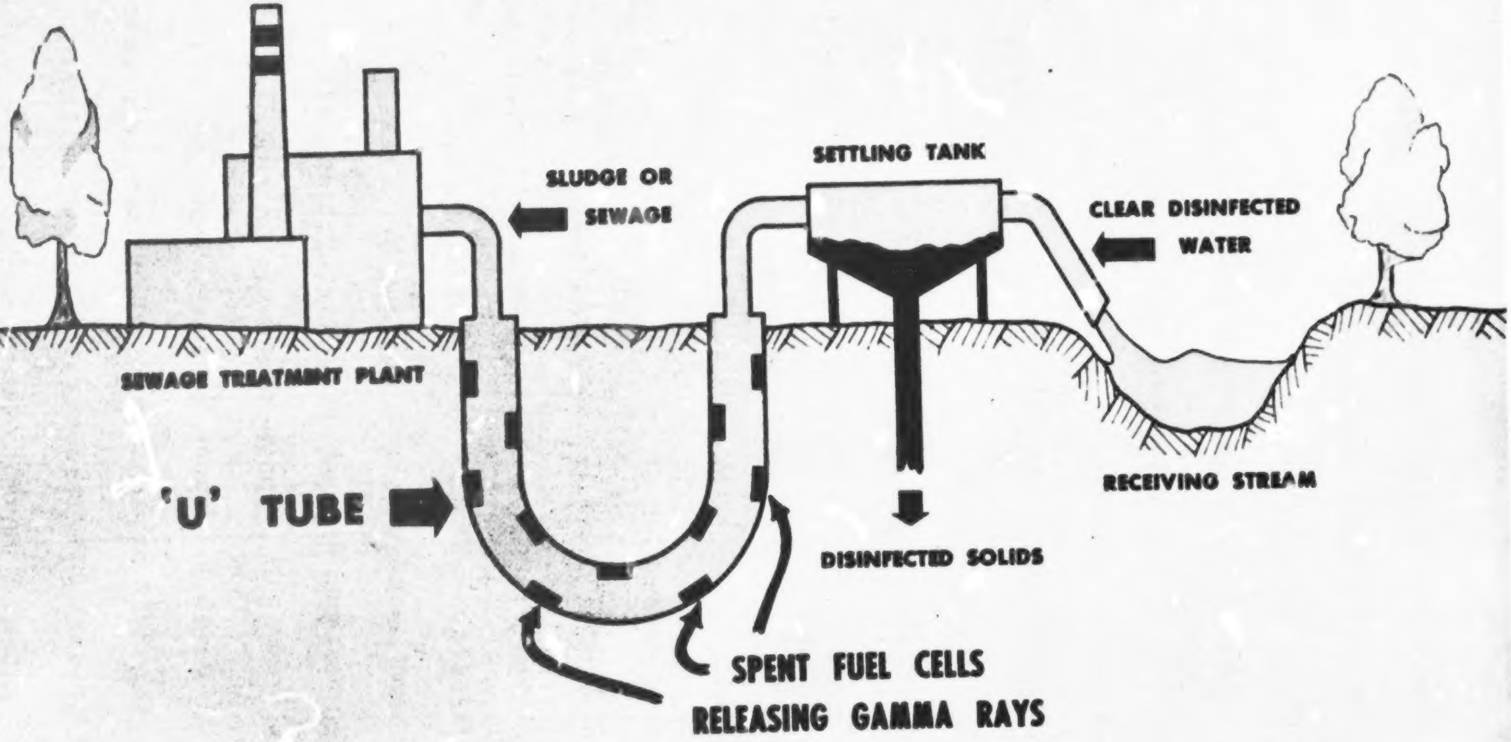
HANOVER TREATMENT WORKS



1. COAGULATION-SEDIMENTATION TANK NO. 2
2. SAND FILTER
3. MICROSTRAINER
4. CHLORINE CONTACT TANK
5. POST AERATION TANK
6. EXPERIMENTAL BAY

TERTIARY TREATMENT BUILDING
HANOVER TREATMENT WORKS


INTEGRATED WATER QUALITY DATA ACQUISITION SYSTEM
N
WILMETTE PUMPING STATION
CHANNEL
LOOP A
SECONDARY RECEIVER
NORTH SIDE S.T.W.
LAKE MICHIGAN
DES PLAINES RIVER
CENTRAL DATA
LOGGING RECEIVER
ADMINISTRATION BUILDING
(ALL MONITORING STATIONS TELEMETER DATA TO CENTRAL RECEIVER)
OHIO-ONTARIO EXPRESSWAY BRIDGE
CHICAGO RIVER
OUTER DRIVE BRIDGE
DU PAGE CO.
COOK CO.
LOOP B
SECONDARY RECEIVER
WEST-SOUTHWEST S.T.W. *
AND SHIP CANAL
SANITARY
CHICAGO
CHICAGO
WILLOW SPRINGS
SOUTH DISTRICT FILTRATION PLANT
NEAR ARCHER AVE.
CALUMET
SAG
CHANNEL
LOOP C
SECONDARY RECEIVER
CALUMET S.T.W. *
LITTLE
CALUMET
RIVER
CALUMET
RIVER
THOMAS J. O'BRIEN LOCKS
COOK CO.
WILL CO.
LOCKPORT
ILLINOIS
INDIANA
* EFFLUENT MONITORING STATION ALSO TELEMETERS DATA TO SECONDARY RECEIVER



TREATMENT BY RADIATION

program properly starts with the water and works backward. In other words, it simply says we want these criteria at certain points along the way, and I am now taking the ten-year point, and it simply says that taking three parameters, fecal coliform, BOD and ammonia nitrogen, that if we provide as specified by the State -- that is, 2,000 on fecal coliform, 4 milligrams per liter BOD, and 2-1/2 milligrams per liter on ammonia nitrogen.

The standards set by this conference allow 5,000 coming out of the Little Calumet and the Grand Calumet into our system, 2-1/2 times on BOD coming out of that river system into ours, and 2 times the ammonia nitrogen.

We submit that if this is what we have to supply in our own waterway from all municipal wastes, such as the Calumet Treatment Plant, we believe this conference should reconsider its standards and tell us if they are going to stick with them, because then I believe Mr. Klassen and the State of Illinois and the Sanitary District and all are going to say we don't want to impose something on our people that isn't going to be met, because we don't want our effluent, not casting stones at anyone, purer than the river water that we take up, so this is something that I believe in the conference is going to have to be reconciled shortly, since again the Board has adopted the ten-year program, and we get back to the Calumet River as well as back to the big dischargers at the mouth of the river.

Again, to continue the summary, United States Steel we are working on and we are working very closely with. We are satisfied with the progress, because if not we would have them under show cause, although we can't spell out the precise dates now.

MR. POSTON: You cannot give precise dates?

MR. BACON: I mean, we could tell what would be done. There is certain reconstruction of the furnaces and the processes and the taking water out of the lake and putting it into the South Slip, I believe it is called, so that it would not be near the lake, and so that we could better carry it out, and we are diverting water to the system.

We can give you details on that, but we have not as yet told them this much by January 1, 1968, this much by January 1, 1969, and so forth.

We are ready to discuss that terminal date.

MR. STEIN: I think the key point is to get the terminal date.

MR. BACON: I think so too.

MR. STEIN: Once we get that, I don't anticipate a bit of difficulty in working backwards.

MR. BACON: We don't either.

MR. POSTON: I do.

MR. STEIN: You do, working backwards from your terminal date?

MR. POSTON: I think that Mr. Klassen's standards have a provision in them, and Mr. Bacon indicated that these standards were looked at favorably by the Secretary. I don't know that, but you may have information.

Mr. Klassen's standards, as submitted, indicated that industries with adequate waste treatment facilities will be required to provide adequate treatment for the removal of contaminants by the end of 1968.

MR. KLASSEN: Yes. We were following the conference schedule. We did not want to take it on ourselves to change the conferees' schedule.

MR. BACON: That is for the one discharger, though, because when the standard was set on the Calumet River, this is an entirely different proposition. We approached this on the basis that had the conference intended to control the Calumet River when it didn't flow to the lake, it would have set criteria and dates, but it did not do so.

This then came under the jurisdiction of the State and of the Sanitary District, and the State set its schedule.

In other words, the schedule of chlorination and solids and tertiary and separation is a very rigid schedule. In many cases, it has gone much further than the total conference is envisioning now, but these other dischargers were assumed, by the action of the conference, to be under the jurisdiction of the State and Sanitary District, and that is why this program was developed as we have presented it to you today.

MR. STEIN: Do you have any questions?

MR. POSTON: Well, the other point that I think we have talked about is only one industry being included in this conference, and it is my understanding that the conference area includes well over as far as you are southwards. I haven't been aware that they had changed the limits of this insofar as the conference was concerned.

MR. BACON: If you will recall, Mr. Poston, the question of standards on the Calumet River was specifically left out of all of the tables, and I would have to assume that if the jurisdiction was there on all the other places where standards were set, that it would be just assumed that they were not going to be assumed on the Calumet, that portion, because at that time we were getting the regulations set as to flow, except for a sliver that comes off of the top, and that there would be no flow toward the lake.

MR. STEIN: Mr. Poole?

MR. POOLE: As I understand, the standards that were set by the conference didn't cover the Indiana Harbor Canal either, or the Grand Calumet River, except that portion that flowed west, but because of the condition of the Indiana Harbor Canal, I assume you could not meet the lake standards without those.

My only question is about your other industries. I was going to raise the same question. I have the impression that other than the South Works, none of the industries can affect the lake except during a period of flow reversal?

MR. BACON: Yes. If we had to bypass, that would be the only circumstance. Of course, we don't envision that very often with the widening of the South Side from 60 feet to 225, giving us really storage capacity with better operation, which I think we are getting every day, and pulling the system down to fix the storm flows; and, furthermore, with the run there about 8 to 10 miles, that we would very often even get from the point of bypass much out into the lake.

MR. STEIN: But again, I think Mr. Bacon mentioned this. This question may be relatively academic, because, like everything else, any program, whether it is our program or his, has to be equitable.

V. W. Bacon

More or less, the dates that he set for that mill on the lake, are going to pretty much govern, give or take a little bit, what he is going to be able to do, or manage to get in the way of correction from the other mills which have not set dates.

If you are talking about the United States Steel mill, they are faced with the problem of commensurate dates for the other industries within their jurisdiction, and would have to take that into account in the same way we take these things into account when we make a recommendation to an industry.

In Seattle last week, one of the oystermen said, "All you have to do is tell the industry whether to clean up, and you don't have to worry whether they will go out of business or can pay for it. It is just that simple."

I think this is the same thing we are faced with here. I don't think, any more than we can cut off the United States Steel mill from the other mills, can Mr. Bacon cut off United States Steel from his industrial program against the other mills in his jurisdiction.

You can talk about this all day, but I don't know whether it is productive to talk about the jurisdictional question. I think the factual question as to when we can get this cleaned up is going to be the measure.

MR. BACON: Mr. Chairman?

MR. STEIN: Yes.

MR. BACON: The Board and all of us recognize that our ten-year program is a tough one, but everything we are doing is designed to make this kind of a cleanup in ten years, or, if it is not going to be ten, just name it fifteen, or, if it is not going to be fifteen, name it twenty, but it has been named as ten years for the cleanup.

As I pointed out here, from our point of view, you can get another percentage point or two of improvement on this system just by tightening up, but you can't get another 90 percent unless you take these two major steps of a tertiary treatment and of the separation of sewers, or the equivalent, and we think we have found the equivalent in the deep tunnel storage system.

MR. STEIN: Mr. Bacon, this may be true but I suspect that what we are doing here, and Mr. Klassen and Mr. Poole have done, is that the program we are talking about with the District is a much more modest program. The conditions in the waters are not very good now, as indicated by the report.

Now, take the stretch of the dates you have from 1968 to 1970. Here is a much more modest program than that ten-year program.

I think the task that the conferees might address themselves to is how we can dovetail and get to work on that first stage of the program.

I have no arguments with you now, and I hope not later, as to your five or ten-year program for the cleanup, but I don't know that this is the job we are hitting today.

A very difficult problem that you pointed out, and I think Mr. Klassen pointed out, is in trying to come up with a definite scheduled program for the mills.

Now, can we go ahead, or do you want to take a break before that?

MR. BACON: May I say one thing further?

Of course, this is what caused the issue. You will remember that on Page 107 or 108 we have touchdown points for each year. It isn't a matter of waiting five years until 1972, or until 1977.

The big chunks come easily at first, but I think the thing that has been lacking in all of our programs in the past is that we get an unrealistic schedule and then can't enforce it, rather than getting a realistic schedule and enforcing it. That has been the bugaboo and it is the very history of pollution control, until we recognize here that they can't get the tertiary -- that is, industry, nor can we -- within a couple of years if the job is too big, but we are saying we believe that we can have major facilities under construction within four years.

What I am saying to you is that we believe that, or at least the other dischargers, and, of course, the same would apply to all of them on the Calumet system with the exception of United States Steel, and that is only because they are a separate case, that this is a tight program actually, but it is a realistic one.

MR. STEIN: I am not arguing that.

I think on your basic point, what you say is very true.

The horror in the pollution control program is an unrealistic time schedule. In one Eastern State we had a conference and the State officials came in and they had issued orders against all the industry, which is largely a petrochemical industry in this case, calling for a cleanup in two years, and they said, "Okay. You can't do any better. Zip up your briefcases and go home. We don't need the Federal Government."

Of course, my answer to that was, "You don't know that you can clean this up in two years. As a matter of fact, an order asking them to clean up in two years will be worse than no order at all.

As a matter of fact, we are now about four years later, and we have just completed our industrial survey, because we have had to go in plant by plant, and we have come up within the last few months with a realistic time schedule for these people.

So there is no argument there.

MR. BACON: Thank you.

CLOSING STATEMENTS

MR. STEIN: As I see the issue, here is the way we have it:

Mr. Poole has certain suggestions, and they projected four specific remedial works, and I think he talked about his big three polluters, and they run into June 1970.

Mr. Klassen has indicated the conference originally stated that we are to be finished by the end of 1968.

You have commensurate dischargers in your own district. Perhaps the bellwether for this case is U. S. Steel, but who are the others? There is Ford, Republic and one other.

MR. EGAN: Wisconsin.

MR. STEIN: Wisconsin. It is the steel companies.

The question here is, do we come up with a terminal base agreement agreeable to all parties on all the steel companies involved in the case?

I think once we get those steel companies, considering your energies and abilities, I don't look for too much trouble in your district. Although, as Mr. Poole said, some of the smaller ones are the ones you have to take to hearing and possibly to court. This has to be done, of course.

MR. POSTON: I should remind you, Mr. Chairman, that it was 1965, in March, over two and a half years ago, where we sat in a similar meeting which had been announced previously, and you talked about the pollution and getting ready to set these schedules, and here today we still have some places where we don't even know what kind of a schedule they are going to adopt for these particular polluters.

I think something must be done about this. Maybe it is beyond our control. I don't know.

MR. STEIN: I don't know if it is beyond our control. I think the notion is to come up with an agreement and then an agreed-upon date.

The easiest way we have been able to do this, and I think Mr. Bacon alluded to this, is to get a terminal date. Once we get the terminal date, if we can get a terminal date for the steel mills to be in operation, we can work our way back.

Now, Mr. Poole has a terminal date for all his mills.

MR. POOLE: June 30, 1970. I have been saying for a year and a half that this is a realistic date, and I still think so this afternoon.

MR. STEIN: Mr. Klassen --

MR. POSTON: Could I make a comment here?

Would it be possible, Mr. Poole, to throw in some intermediate dates here for the start of completion of the plans, and dates like we had before, just some several years hence?

MR. POOLE: Well, we had an intermediate date for plans of the first of July, 1967, and our report indicated that we have all the plans except certain of those of Youngstown Sheet and Tube.

MR. POSTON: Then start of construction, and this would be --

MR. STEIN: Mr. Poston, may I make a suggestion? Let us try to see if we can agree on the terminal date first.

I have been through this procedure many times, and I know Mr. Poole and Mr. Klassen have, and I am sure Mr. Bacon has in his capacity. Once you get the terminal operation date, it seems to me that setting up the interim dates is a matter of projecting backwards, and is a relatively simple problem.

After all, you can't have much leeway on the preparation for plans and specifications or the letting of a contract if you have a terminal date, unless you set that way, way in the distance.

I think the key point here is we have a proposal, and it might be a fait accompli, by Mr. Poole of a terminal date of June 30, 1970, for the steel mills.

First, what do the conferees think of that, and, secondly, what should be a reasonable date for the operation in Illinois? These, I think, are the key issues we have to assess.

I don't think we are arguing much what the mills have to do, are we? There is pretty much agreement on the remedial program.

MR. EGAN: Right.

MR. STEIN: There is no argument about that. It is a question of when they are to do it, and this is just for the first stage of the program.

Do we have any suggestions from Illinois, or the Sanitary District?

MR. KLASSEN: I will speak on that.

I can only state, from the Illinois Sanitary Water Board's standpoint, the policies that we have found that have been fairly effective.

Closing Statements

We have submitted to the Federal Water Pollution Control Agency criteria for the streams in this area with a date that industries must provide adequate treatment by December 1968. We have followed this because this was a conferees' date.

We found the policy that we have followed, that if you are going to reevaluate and give more time, a very effective program that has produced results is when that deadline has been reached, to evaluate not necessarily just what they are doing, but when they started doing it.

I am not too sure that these industries in question immediately moved right after the March 2nd conference. I don't know.

But, at the time that the deadline is reached, that is the time to evaluate whether an industry or a city deserves more time, and if you find that they don't deserve more time, a very effective next move is to move into legal enforcement.

This sometimes is what it takes. Maybe this is the next step.

MR. POOLE: I don't know what kind of luck they have in the State of Illinois with legal enforcement, but what we have had in Indiana for twenty years is that if you move one of them into court, why, it is a matter of taking about eighteen montns. It is just piddling time. That is, you have lost anywhere from three to seven or eight or ten years to get them in court.

MR. KLASSEN: Except, Mr. Poole, this is a Federal case, and the Federal court would handle this.

We have heard so much about what they are going to do in enforcement, maybe we should see some of it.

MR. STEIN: I hope we are in a legal enforcement operation right now, but I think --

MR. KLASSEN: I don't think we are, Mr. Chairman. I don't think we should go under that illusion.

MR. STEIN: The conference is the first step of the legal enforcement procedure.

MR. KLASSEN: It is the first step, but the next step is witnesses under oath, and more than just talk.

MR. STEIN: Well, I hope that is right.

Mr. Poole has a point too. You know, when we did go to court in St. Joseph, we won the case hands down, but I don't know that that got the treatment any faster. They are still connecting the sewers down there.

However, I think your point is well taken. Let me call your attention to this point that was determined, and I think by all these people at the table at the last progress evaluation meeting we had. I think Mr. Klassen is right in his point. He says:

> "The conferees have scheduled another progress meeting for September 6, 1967".--

We are not far off, are we?

> "At that time the question of a reasonable date of compliance will be open for discussion. At the September 6th meeting the conferees will have the benefit of the action program developed by the States and the District and will be in better position to evaluate the further progress of the municipalities and industries. Adjustments as may be necessary" --

and here is the key point --

> "will be determined by the conferees on the basis of the municipalities and industries demonstrating that they have made a bona fide attempt to move forward as rapidly as possible in accordance with the established remedial schedule. Appropriate recommendations in regard to such adjustments will be made by the conferees to the Secretary of the Interior."

As I heard the reports here, we got a pretty detailed notion of what was happening. Again I will take the steel mills, for not any particular point, but because

I think at this point they are probably the crux of the problem, and a pretty detailed report from Mr. Miller as to what was done with the steel mills in Indiana and what they are going to do--and we very well may be in a position to evaluate the further progress of the industries there.

The question here is whether we have had the same kind of information on the industries in Illinois so that we can make a determination whether they have made a bona fide attempt to move forward as rapidly as possible in accordance with the established remedial schedule. I don't know that we have had that.

If the conferees do believe we have had that, maybe we can move on, but I think Mr. Klassen's point is well taken. This is what was determined at the last meeting, and I don't know that it is inconsistent with the philosophy he has already expressed.

MR. KLASSEN: Speaking of Illinois industries, we have detailed the only two that are involved by the Sanitary Water District, and I think from the Sanitary District's very complete report here, the information is there as to what they have done.

I wouldn't speak for them --

MR. STEIN: What about U. S. Steel?

MR. KLASSEN: This I don't know.

MR. STEIN: The point is, if we are going to do this, we have to have industries demonstrating they have made a bona fide attempt to move forward as rapidly as possible.

That may be in the record, but I am not sure if you don't know it in Illinois -- and I have not read the record yet -- this is for the conferees to decide -- how on earth you know what they have done so that you can make a determination whether they have made a bona fide effort to move forward as rapidly as possible.

MR. BACON: We know that from the one that is involved that they cannot meet the December 31, 1968, date. And if any one of us, or particularly you, were called as an expert witness in court to try to enforce that date, the first thing we would be asked is if it is reasonable, and every one of us, as expert witnesses, would have to answer that in the negative.

MR. STEIN: No.

MR. BACON: Wait just a minute.

The next question we would be asked is what is reasonable, and I think that is really what we are seeking here today.

We would have these companies in on show cause, which is a rather potent device that we can use, if we were not satisfied, and that was why I read the one paragraph showing that we had them in on show cause in a number of cases, because we were not satisfied they were operating judiciously enough, and in some instances not in good faith, and that we were being given a run-around.

I have talked to some of the other conferees about this and we have talked in detail in our shop about it with the President here, and with others, and it would be pretty hard to support a December 31, 1968, date.

We would rather get a date that is enforceable, and we think that something along the lines that Mr. Poole has suggested, only that we mean business on rather than getting a date that we could not sustain, would be the answer.

MR. STEIN: No. Let's go back.

What I am trying to do is deal with Mr. Klassen's point. Mr. Klassen says that if a date is out, then we will reconsider it.

Now, this was put in:

> "Adjustments as may be necessary will be determined by the conferees on the basis of the municipalities and industries demonstrating that they have made a bona fide attempt to move forward as rapidly as possible."

Now, reading from this report, and I am just dipping in anywhere, Perry Miller's report is replete with these dates. He goes into Gary Sheet and Tin Mill, the 84-inch hot strip mill waste treatment plant and deep well disposal system, which facilities are in operation, Inland Steel, East Chicago, final plans for the waste treatment facilities for Plant No. 2, and the No. 3 Coke Plant, and No. 2 and No. 3 Blast Furnace areas approved on June 20, 1967, the oil skimming facilities for treatment of wastes from the Plant No. 2 sewers approved on August 15, 1967; and then go on to the facilities.

What I am saying is that the proposition that Mr. Klassen has proposed is that before we go forward to consider a date, we should make some attempt at determining whether the mill has made a bona fide attempt to move forward.

Now, I don't know, as compared to this, what we have from the Illinois mills to make that kind of judgment.

These are determinations that we have. The present status is that this company installed waste treatment facilities which were found to be inadequate. They are presently intending to remove oil process wastes from the river drains.

The question is whether this is a bona fide attempt to move forward rapidly.

Republic Steel: Now that standards have been set they are proceeding with final engineering plans.

MR. BACON: May I interrupt for just a minute, Mr. Stein?

MR. STEIN: Yes.

MR. BACON: You see, having assumed that there were no standards on the Calumet River, which there were not, up until June 28th we couldn't proceed, nor could they. The criteria for all these industries, except one, were not available until June 28th.

Our position on all of these dischargers beyond the O'Brien Lock in the jurisdiction of this conference is that nothing was given to them, because the new Federal Act implemented by the State and the Sanitary District could not become operative until June 30th, and you might even say it doesn't become operative until approved by the Secretary of the Interior.

This is all these people could do, or we could do. We are not copping a plea for them or us, or anything else. The criteria, standards and what to do and a timetable had not been set until June 28th, effective June 30th.

Immediately thereafter, all of this has been placed in a timetable, as I pointed out to you, on Pages 101 to 107. That has been set now. We have set timetables for one year, two years, three years, so that at any time, should we feel the need, we can move into court.

MR. STEIN: What do you think would be an appropriate timetable for U. S. Steel to complete?

MR. BACON: We know the situation fairly well as far as the work supply over in Indiana, and I think it would be even tighter over here, but certainly what Mr. Poole has suggested I think is reasonable and enforceable.

We want a program that is definite, but that is also reasonable, so that it is enforceable. They know as well as we do if we have something where we can eventually take them into court and it is not enforceable. We want something that is enforceable so that we can start moving on a one-year, two-year and three-year basis.

We have an extremely good program under the State and the Sanitary District's ten-year program, and it is designed to get the bulk of the wastes the first two or three years.

Now, let me continue. You see, I really believe there is a weakness in what we are doing in this conference area, because although we are talking about industry and the December 31, 1968, or June 30, 1970, date, we haven't said a word in this entire area about the combined sewer problem, and that is just as big an issue.

MR. STEIN: There is no argument there, Mr. Bacon.

That is another issue, and that is an issue for the conference.

The point is that we can't always stretch out the ten-year program, or make the ultimate program the answer that you have to get this whole thing done before you do a part or a segment. Otherwise, you wouldn't be drinking in Chicago today as well as you are, because you still have combined sewers.

When these dates were set by the conferees, they were set with the notion that they were realistic at the time and they were legally enforceable, and you had representatives of the Sanitary District who said it. We did not think they were unrealistic at the time.

What you are now saying is that because of the intervention of a new law, for a considerable amount of time nothing much was done until the standards were set so they could not move ahead with this program.

MR. BACON: As I recall the history, the Calumet River was very definitely and deliberately left out from the consideration of this conference for the reason that at that time we had a pretty good idea of the Federal law of 1965 coming, and that certainly thereafter, in the latter part of that year, it did come, which put the setting of the standards under the State, and so, naturally, since it was not taken under the jurisdiction of the Federal conference by providing criteria, it was, and rightfully, assumed that it went directly under the Act of 1965, which called for standards.

Now those have been set, and I think they are standards higher than any place in the United States, but they are very reasonable and practical. It gets the big chunks. I mean, we can get into it with standard processes, and so forth, within one year and two years, and then, in our district anyway, the tertiary applies to the industry the same way that it applies to us.

MR. STEIN: We are not talking about tertiary now.

MR. BACON: Well, we are, and so this is why I say we believe our schedule is really as tight from the standpoint of control, and it sets it up for the remaining years.

MR. STEIN: How did your standards set on the Calumet affect your program for U. S. Steel?

MR. BACON: U. S. Steel is under the conference.

MR. STEIN: Yes, but you have said that nothing was done because they were waiting for standards.

Here is what you have for U. S. Steel:

> "Now that standards are set they are proceeding with final engineering plans."

Why did we have to wait for standards on U. S.

Steel, when the steel companies in Indiana could move ahead?

MR. BACON: This is not really what happened. They have been designing for these standards on the lake ever since they were issued.

In fact, they have plans for remodeling the entire plant, which are on the drawing board, for taking their wastes out of the lake and into the South Slip.

The only thing is, we can't say that they are going to build right now if we have a terminal date which we do not think is realistic, and we don't think it would have been realistic for us either.

MR. STEIN: It may not have been realistic, but the question, I think, is for Mr. Klassen and Mr. Poole to decide.

Mr. Poole has been able to set forth a program and come up with specific improvements based on the conference recommendations. The United States Steel Company report that you have says now that standards have been set. He was able to move ahead with the program.

The question is, what is the difference between the U. S. Steel and the problem that Mr. Poole had with the steel mills in Indiana?

MR. BACON: No difference whatsoever.

The U. S. Steel South Works Plant has a tougher problem because of the age of the plant, but I think they are as far advanced as any of the other dischargers.

MR. STEIN: I am not arguing that.

MR. BACON: If not, we would have them in show cause, and the minute we are convinced that they aren't, we will put them in show cause.

MR. STEIN: These other conferees are engineers. The question is if they are satisfied.

Here, as I read the last line, U. S. Steel South Works will have made a bona fide attempt to move forward as rapidly as possible. The question is whether they have sufficient information to make that judgment.

Now, it can be one way or the other, but I would hate to see the conferees not able to make the judgment because of lack of sufficient information.

MR. POSTON: We have to rely on, or I do, the individual conferees in their particular area of authority for following through on these.

I would like to hear from the Sanitary District what date they think is a date by which they could comply insofar as abatement of industrial wastes from U. S. Steel.

MR. STEIN: He has already said that it is Mr. Poole's date.

MR. BACON: That is tough, but we would be willing to accept it.

I have talked to the representatives of the steel company. I think the problem is much more difficult on this side of the line. Maybe they will have to make more effort.

MR. STEIN: What do the people here think about this?

Mr. Klassen, do you want to comment on that?

MR. KLASSEN: What is the issue, Mr. Chairman?

MR. STEIN: The issue is that you have a 1968 date, and Mr. Bacon and the Sanitary District is proposing that U. S. Steel remedial works be in operation by June 30, 1970.

MR. KLASSEN: Let me tell you our position. We submitted to the Department of the Interior the criteria and standards that Mr. Bacon referred to for the rest of the District, the rest of the area, not only including the conference area with a 1968 deadline for industry. It was submitted to Mr. Udall. It was the official document from the Illinois Sanitary Water Board, and we did this because of the dates that the conferees set.

Now, I have one suggestion that is going to look for some uniformity. I am addressing myself now to the Federal water pollution people here.

If Mr. Udall, in reviewing these criteria, would suggest that the rest of the area here and our dates be set up from 1968 to 1970, I will take it back to the Sanitary Water Board and see if they agree with that.

MR. STEIN: Mr. Poston, do you have any comments? No one is obliged to make any comments.

MR. POSTON: I would like to see, in addition to this terminal date, these intermediate dates, so that progress could be judged in the future without waiting for a period of time until June 1970, added to this.

MR. POOLE: We can't give them to you off the top of our head this afternoon, but I had assumed that if we followed the pattern of conferences in the country to reconvene every six months out here, that there would be periodic progress reports, just as this one today, and as the one in March, which would give the conferees an opportunity to find out whether we were holding our own or gaining ground or losing ground, but I have no objection to giving a little time, and if you want the conferees to get back together to try and figure some starting dates, as far as Indiana is concerned, the plan date is all over with except for those three or four of the facilities that Youngstown proposes. The preliminaries have been in, but not the construction drawings.

MR. STEIN: I am asking this: Mr. Klassen, you were in on St. Louis too. Isn't the pattern in these cases that once we set a terminal date, which is not too far, that you move ahead and you can pretty well tell where you don't get progress?

Now, you have outlined these as well as we have, and in report after report, it seems to me rather clear that Adolph Plating Company was lagging behind. Mr. Poole indicated that he was going to ask the Board to cite them and bring them into an enforcement action.

It seems to me that as we report every six months, it looks like a few clouds may be overhead unless an agreement **results**.

I think Mr. Klassen did a superb job with that in the East St. Louis situation, where you had many industries and many communities, and after we went back for the periodic progress meetings, he kept pushing them ahead, and the ones which did not go ahead soon came to the surface and he zeroed in on them and moved ahead.

Again, it seems to me that periodic public progress meetings show these things up.

However, our key point is that Mr. Klassen has made a proposal and the standards are in and the Secretary has asked us to report back to him.

Closing Statements

Mr. Poole, do you want to state anything?

MR. POOLE: Well, I think it might make it a little easier on everybody concerned here if we could agree this afternoon that June 30, 1970, is a realistic date.

I am reading here Mr. Klassen's report that he has submitted to the Secretary. He stated:

> "Adequate treatment for removal of contaminants by the end of 1968."

I wonder if he thought specifically of the South Works and the magnitude of the work that was involved here, when he wrote that sentence. From what I know of the South Works, which is mostly from driving around them, I don't see how it could be done by December 1968.

MR. BACON: May I make a suggestion?

MR. STEIN: Yes, surely.

MR. BACON: Mr. Klassen, does Regulation 15 address itself to the area? Does it overlap the conference area?

MR. KLASSEN: Yes, it does.

MR. BACON: Into the U. S. Steel Works?

MR. KLASSEN: Yes. Starting on Page 8, we refer and included in there Lake Michigan, Wolf Lake, Grand Calumet, and took it on, and No. 6 on this date refers to all of the area.

I just want to say that we put the end of 1968 date in there to keep it consistent with the conferees.

Let me say here -- I was going to this morning -- that I in no way criticize the State of Indiana for making a change, and I know they undoubtedly felt that it was justified. We did not in Illinois feel that we should change this date without going back to the conferees for a change of date, and so we put it in to make it consistent with what the Federal Government had already approved.

MR. POOLE: We are back with the conferees now.

MR. STEIN: Well, I am listening. Two of the conferees are in favor of the June 30th date. And I take it Mr. Klassen's position is that he put in the 1968 date to be consistent with the conferees, and his proposal was that if Secretary Udall, after considering the discussions in this conference, wants to make a recommendation that this be extended to June 30, 1970, he will take it back to the Sanitary Water Board to consider it.

Have I stated your position?

MR. KLASSEN: Yes. If it is going to be consistent, then this would seem that this would be the action that he would take, and I would take it back to our Sanitary Water Board to see if they agreed with what Mr. Udall suggested. They probably would.

MR. BACON: Mr. Stein, I believe you have to draw a sharp line here between in Illinois the one industry on the lake and clearly under the jurisdiction of the conference and all others, because I believe the State Sanitary Water Board document here pertaining to all others, is consistent and clear, because we have charted all of this out. We have showed it to you up there. That is what it said, and so we are not then talking about changing the other industries along the Calumet.

If you look at this document that we gave you, beginning on Page 102, we have certain things that we expect by December 31, 1968, under the State program compliance schedule, and there are seven points under that. Then we allow another year.

This all meshes with the regulation they adopted, namely, Regulation 15, on the inland waterways beginning at the mouth of the Calumet River.

This is clear, this is practicable, this is meetable, and this is enforceable.

MR. STEIN: Yes.

MR. BACON: So, really, our question is on that one discharger as to whether it is an enforceable schedule.

MR. STEIN: By the way, at the present time, Mr. Bacon, I am trying to get as clear a statement as I can from the conferees of their positions, and I have stated their positions as carefully as I could.

Mr. Poole has suggested that all the conferees agree on a June 30, 1970, date, for all the remedial field work on the steel mills.

MR. BACON: You mean the steel mills have those criteria under the jurisdiction --

MR. STEIN: Of the conference.

MR. BACON: Have those criteria. That was what we were trying to set up when we set up a system preventing the river from flowing back into the lake, and those industries on that waterway aren't under the criteria out on the lake which they never reach. Do you follow me?

MR. STEIN: I follow what you are saying, Mr. Bacon, but let's try to get one point at a time.

The point is Mr. Poole has three major steel mills where he has a June 30, 1970, date. We have a major steel mill in Illinois where Mr Klassen wants a December 31, 1968. date, and which the Sanitary District has also proposed a June 30, 1970, date.

This is the difference, as far as I can see. If we can agree on that, I don't think there is a fundamental difference on what they have to do, or what they have to meet. I don't think Mr. Klassen or you or the Federal Government or U. S. Steel, for that matter, really have an essential argument on what kind of remedial facilities they have to put in. This, as I see it, is the whole issue.

I think Mr. Klassen's view is clear, unless you can think of another formula that can bring the people closer together. One doesn't occur to me now, unless we get Mr. Poole's point that all the conferees agree on June 30, 1970, and I take it we are not getting that. Is that correct?

MR. POOLE: Well, of course, we have never had motions along these lines in any of the other conferences that I have participated in. Do you want a motion?

MR. STEIN: No. If I read the law correctly, I am not bringing back a vote of the conferees to the Secretary. What I am trying to do is bring him an analysis, like you analyze the legislative hearings before a Congressional committee, as to what the various people thought, and what their positions were, and give it to him.

We are not constituted as an elective body where we vote amongst **ourselves**, and we try to get an agreement. Under the law, the Secretary makes the determination and the recommendation afterwards, and he takes all the views into account.

Are there any other points to be brought up along these lines?

(No response.)

MR. STEIN: If there aren't, what other points do you think the conferees should take back as conclusions to the Secretary, other than the summary of the report?

Your man made three recommendations this morning in the Federal report. Do you want to dig those out?

MR. POSTON: No, I think not.

MR. STEIN: Mr. Bowden did. Do you want to take those up or not? He placed them before the conference.

All right. Here he raises the question, and I think we can almost do this ourselves if we want to. This is a broader question, and let me read it:

> "That numerical criteria for total iron, cyanide, sulfate and oil be included in the standards adopted for the Grand Calumet River."

If we are going to begin tinkering with these standards and come up with additions, first, do you think we should; and, second, should we get a technical committee again to see about adjusting those standards or criteria or requirements, so that the surveillance group will have something to check with, or are you satisfied with the existing requirements we put out?

MR. POOLE: As I indicated this morning, and I have discussed this issue with Mr. Poston and Mr. Bowden before on this No. 1 point, I don't think it is necessary.

We can put them in the Grand Calumet criteria that we submitted to the Secretary. We did put them in in the Indiana Harbor, and they are in the inner lake standards, and they are in the outer water standards, and certainly they are in three locations, and I think you can control the numbers on No. 1.

Now, I don't know as to No. 2.

MR. STEIN: Let's take one at a time, if you don't mind.

MR. POOLE: All right.

MR. STEIN: I take it then we were fairly well satisfied with the meaningfulness of the report we got this morning, including iron, cyanide, sulfate and oil, which would give us the picture, and we could get that without changing the basic requirements. This, as I understand it, constitutes the views of the conferees.

Let's go to No. 2, that the criteria for ammonia in open Lake Michigan waters be reviewed in light of the high levels routinely found in the lake and the recommendations in the Laboratory Committee's report on ammonia.

What do you think of that?

MR. POOLE: I will defer to Perry Miller or Doug Morton on that.

MR. MILLER: I would like to know what he has in mind.

MR. STEIN: All right. Mr. Bowden, would you come up, please?

Would you precisely indicate what you might have had in mind on that one?

MR. BOWDEN: Yes. In open Lake Michigan waters, the criteria call for an annual average of 0.02 milligrams per liter and a maximum of 0.5.

The Technical Committee's report indicates that the previous data of 0.10 milligrams per liter would have to be interpreted with extreme care in the precision of these tests, with 0.02 milligrams per liter when they are below 1/10th of a milligram per liter, and the results in the lake, of course, are all much persistently higher than these values.

The question in my mind is whether it would ever be possible to meet these criteria.

MR. STEIN: In other words, you are saying in a sense what Mr. Bacon pointed out with those two orders, that we have a requirement that has not been met, and probably won't be met, and shouldn't we come up with a realistic requirement that we can judge against?

MR. BOWDEN: Precisely.

MR. STEIN: All right. We would have to refer to a Technical Committee on that.

If the point is a valid one, and this may very well be a valid one, can we ask the two States, the Sanitary District and the Regional Office to appoint a technical committee to at least have one meeting on this; and, Mr. Poston, if you will do this, will you see if this should be changed and come up with a specific recommendation on this, because if we are dealing with an unrealistic requirement, something obviously has to give.

I think this is the kind of judgment, whether it is realistic or not, where the Technical Committee should not feel that their job is changing.

First, the determination is whether it is unrealistic, and, secondly, whether we can come up with a realistic one.

If you are all agreed, Mr. Poston would check that up, because this looks like something that should be done in the procedure we developed.

Then you have the criteria for MBAS in No. 3. What is the score on that?

MR. BOWDEN: The limitation on MBAS on Wolf Lake?

MR. STEIN: You can't find out what the farmer is doing.

MR. BOWDEN: May I refresh my memory by looking at what the limitation is?

MR. KLASSEN: While he is refreshing his memory, could I ask you a question, Mr. Chairman?

MR. STEIN: Yes.

MR. KLASSEN: Did I understand in the previous discussion that we would be permitting a higher level of ammonia than exists in the lake now?

MR. STEIN: No. The previous level that we were discussing was where he was checking against ammonia and the requirements that the Technical Committee had had, which were so low that they did not get counts that realistically got down to that level. And the judgment of the surveillance group is that they would not and they did not really have a meaningful requirement to check against, because the counts they got of ammonia were always higher than the criteria they were judging against, and that the surveillance was not meaningful unless they came up with a limitation that would be meaningful.

MR. KLASSEN: By changing these, would we be in compliance with the Federal Act that was supposed to enhance the waters?

MR. STEIN: No. The waters have never been degraded. The ammonia has always been the same.

What they are doing is, they have come up with a figure that presumably, if I understood him, in these waters did not achieve, and probably would not achieve, and you got a real low figure. You have a real low figure on something, and I don't know that you are enhancing it or putting it down.

MR. BOWDEN: May I clarify this?

MR. STEIN: Yes.

MR. BOWDEN: The figures, I believe, were originally based on data that was available for the lake at that time.

The Technical Committee report on ammonia indicates that this data really isn't reliable, and the best they could do was the precision of 0.02 milligrams per liter plus or minus, so if you have an average that is allowable of 0.02 and your tests come in with a better precision than 0.02, you can't really enforce it.

MR. STEIN: I think it is an analytical technique.

When we first started on radiation, we used to have a radiation level of 5 micro-microcuries per liter. They used to have tests at that time which were not accurate at that time, as to whether we could measure micro-microcuries to plus or minus 1 micro-microcurie.

I don't know whether you were in that one, Mr. Klassen. We sat through several meetings trying to perfect the ammonia technique. As a matter of fact, the Sanitary

District was with us.

This gave us the most difficulty in trying to get reliable results, splitting samples, and getting two laboratories to come up with the same answer.

Evidently, the techniques were still relatively new. The notion these boys have is that they had better make adjustments and measurements that are meaningful. In other words, they are taking ammonia measurements and are not getting any meaning out of them.

MR. KLASSEN: Would there be any advantage in waiting until a cleanup job has proceeded to the point where they are all doing what they are supposed to do and then re-evaluate it?

Perhaps we are permitting higher ammonias now just because the analytical determinations weren't adequate. I don't know.

MR. STEIN: I don't know. As I said, the Technical Committee would meet on this.

My view on this, and this is just a personal one, is that I would like to see these fellows keep working on it. If ammonia is a realistic thing which we should be looking at, I think in the Chicago area, considering the four jurisdictions here, the technical boys have probably made as much advances in actually measuring ammonia in the field as anyone in the country.

This still remains a tricky substance, and my view is that as long as we have the program working, and we have all this expertise here, I would like to turn the boys loose on it.

If they think it is not meaningful to measure this stuff until we are through, then we will wait, but let them look at this again, because it is clear we are going through an analytical procedure and we are not coming up with very much.

MR. KLASSEN: All right.

MR. STEIN: Now, the last one. How about the MBAS? Is that the same?

MR. BOWDEN: Well, MBAS is the measurement of the methylene blue active substance.

The standards in Wolf Lake call for a maximum of 0.05 milligrams per liter, and an average of 0.02 milligrams per liter.

Standard methods for MBAS clearly state that any value below .5 -- in other words, one-half milligram per liter -- there is no serious detergent problem because there are positive interferences with the tests. My people in the laboratory have the opinion that we can be sure if we get .1 milligrams per liter that there is some surfactant in the water, but you can get .1 without having any surfactants in the water because of the positive interference with the tests.

So how can you enforce a criterion that calls for a maximum .5 when your tests can read .1 and it is quite possible to have none in there whatsoever, and still get a tenth of a milligram per liter indicated on your tests?

MR. STEIN: Theoretically, this is the same kind of problem.

MR. BOWDEN: Precisely.

MR. STEIN: Again, we may have to have different experts on this committee, but I think we should get a committee to look into this and report back.

These are the problems you inevitably get in any new technique. It doesn't change in any part of the country. We had the same thing on the West Coast last week, so don't feel bad.

MR. BOWDEN: Mr. Chairman, may I make a comment on the first recommendation that I made?

MR. STEIN: Yes.

MR. BOWDEN: The criteria established by the Technical Committee for the Grand Calumet River were established at the State line.

Now, the stream at the State line is a small stream. It is 10 cfs, so these criteria were established by the Technical Committee, I assume, on the basis of a stream that is 10 cfs, and, in fact, these criteria recognized that the stream is basically effluent from a sewage treatment plant.

Now, these identical criteria are being applied over here (indicating). At this point here the stream is not 10 cfs; it is 700 cfs. It is not effluent from a treatment plant. It is effluent from one of the largest industrial complexes in the world, and the criteria established here for this point (indicating) except for phenols are being met now, and this stream is one of the most polluted streams in the world.

Personally, I don't think that the criteria is adequate for that stream in that section.

MR. STEIN: Again, don't we have the problem here? Were these adopted standards by the Federal Government and the State?

MR. BOWDEN: They were.

MR. STEIN: For the Calumet River?

MR. BOWDEN: They were adopted.

MR. STEIN: Why don't you take them up that route? In the enforcement case, we are really dealing with material at the State line, or where it comes down into the lake.

aren't we?

The point is, I can see going up the stream in an enforcement case if you wanted to identify a polluter that was making the contribution in interstate pollution. The only pollution we are concerned with here is stuff from Indiana that affects Illinois, or vice versa. In other words, anything coming here that goes this way has to cross the State line and has to get out here and come over here (indicating) before we could go into it.

Now, we really don't care what the situation is in here, except in that standard provision, because this is an intrastate stream.

The only reason, from an enforcement point of view, that we would want to go here, is because when you got to here you would not know where it came from, and we would want to go right up in here to find out which mill it came from, but that has nothing to do with criteria or requirements. That is an identification of what contributes to the material coming out.

While you may have a point technically, and I am with you and I sympathize with you, I think the approach here is the standards approach, which is a different philosophy than the enforcement approach, standing on the border of Illinois and watching for anything that endangers health or welfare of people over this line.

MR. BACON: Mr. Bowden, could I ask a question?

MR. STEIN: Yes.

MR. BACON: Did I understand you to say the river is very polluted, but still it meets standards?

MR. BOWDEN: Yes, it meets standards, because the standards are set for a very small stream and there you have a very large stream.

MR. POOLE: The river is covered with oil. It doesn't meet minimum standards. It may meet one or two of the specific things he is talking about.

MR. BOWDEN: But it meets many of the standards.

MR. STEIN: I think we are getting off on this. This is in the standards program.

The enforcement operation, I think we are all agreed, has to deal with what happens at the State line.

MR. MILLER: It doesn't meet the standards.

MR. STEIN: Mr. Miller says it does not meet the standards, just for the record.

Do we have any other items to take up in this progress meeting?

MR. EGAN: What did we decide about the dates?

MR. STEIN: Let me repeat this. The report that I will make to the Secretary is this:

That Mr. Poole has certain dates, June 30, 1970, for the three major steel mills in Indiana. He also has a program moving forward in many respects to meet the compliance schedule here, as does the Sanitary District, for many of the features of their program, as does the State of Illinois in moving forward the communities and the few industries under its jurisdiction. That is, this is proceeding apace.

We can indicate also, or at least the record will show, that there is no real improvement in water quality. As a matter of fact, the Chicago water people indicate that in their opinion the water has been deteriorating, and our investigators have indicated substantial areas of pollution in the streams, and that improvement probably cannot be expected until main works are put into operation; that no definite date has been set for the operation of the U. S. Steel South Works in Illinois, and this would be a key industry for compliance in the Sanitary District's program; and that the Sanitary District has suggested the June 30, 1970, date that has been adopted by Mr. Poole and put in the implementation plan for the standards and approved by the Secretary of the Interior for Indiana mills apply to the U. S. Steel South Works in Illinois; that Mr. Klassen from Illinois has stated that he has asked for a December 31, 1968, date in his implementation plan, which has gone forward to the Secretary, and that he was carrying out the determination of the conferees at the last conference, and that while the Sanitary District representatives and the Indiana representatives thought this June 30, 1970, date was all right, Mr. Klassen indicated that if the Secretary said the June 30, 1970, date would be appropriate, he would be glad to take that recommendation back to the Sanitary Water Board of Illinois and have them reconsider the matter.

MR. BACON: Wouldn't the Secretary simply ask what is the recommendation of the conferees?

MR. STEIN: He has the recommendations of the conferees. He has the recommendations of the two conferees. He is going to get that. He is going to get your recommendation and he is going to get Mr. Poole's recommendation.

MR. POOLE: What about Mr. Poston's recommendation? Can I ask?

MR. STEIN: You can ask Mr. Poston. I will be glad to hear it and take it back.

As I say, there is no obligation for anyone to talk if he doesn't want to.

MR. POSTON: I have a great deal of respect for Mr. Poole and I know how Mr. Poole has worked to get this date moved back to as far as June 1970, and if the Secretary would ask me what I would say on this, I would have to agree to go along with Mr. Poole, I imagine.

While I don't like the extension of time limits, I recognize that this is a conference and that reasonable people have to sit around the table, and it would be my judgment at this time that this is the best date that is obtainable.

MR. STEIN: All right. Let me ask all of you conferees this. You have the advice of engineers, and I think the Secretary will ask this. No one has to answer this question if he doesn't want to.

Mr. Egan, in your opinion, can the December 31, 1968, date be met by the U. S. Steel South Works, and is this a realistic schedule?

MR. EGAN: From what we know now, it is not a realistic schedule, and we don't want to be saddled with that date as long as it isn't practical.

The other date, the one in 1970, is a much more practical approach.

MR. STEIN: Mr. Poston, do you think a 1968 date is a realistic date?

MR. POSTON: Well, I thought I just stated --

MR. STEIN: No, no. Again, unless you put yourself on record, I am not going to infer anything you said to the Secretary You just can't do that.

You don't have to answer the question, if you don't want to.

MR. POOLE: He just answered it.

MR. STEIN: No. He said it was the best they could do. You make these determinations. They are hard questions and you have to answer them. This is what the Secretary is going to ask.

By the way, this isn't an unusual question, because this is a question I think Mr. Poole asked himself, Mr. Bacon asked himself, and I have been asking myself from the beginning, and so have Mr. Egan, and, I am sure, Mr. Klassen. This is the key question that the Secretary is going to ask.

MR. POSTON: I would say now that without even a plan worked out for the South Works, that it would be very difficult to meet that 1968 date.

MR. STEIN: No.

MR. BACON: We didn't say that. They have lots of plans. They have been working a long while and have been in our shop many times.

They have plans, very definitely, but they are not in construction form yet.

MR. STEIN: With that, do you want to answer the question?

MR. POSTON: Well, I felt originally that this was a very logical schedule and could be met, and I think a lot of these things depend upon the efforts you put into them towards completion of them.

MR. STEIN: Let me put the question to you another way.

Considering the state of affairs, as you know them now, do you think that the South Works can meet that 1968 date realistically?

MR. POSTON: I see that the South Works have indicated that this was impossible, and I would have to go along with their judgment.

MR. STEIN: All right.

By the way, I don't know that they have indicated that it was impossible.

MR. POSTON: Mr. Egan just indicated this, that they could not meet it.

MR. STEIN: Mr. Egan, does the South Works believe this?

MR. EGAN: As far as we have learned, it is my judgment that they cannot meet that schedule.

MR. STEIN: Right. Mr. Poole?

MR. POOLE: Well, based on my experience in our own mills, and with my limited judgment of the South Works, I don't believe they can meet that December 1968 date.

MR. STEIN: Do you want to try your hand at this, Mr. Klassen?

MR. KLASSEN: I will again express my views. I think there are two factors. Let's leave the South Works out of it. Let's leave it at any industry.

Maybe they can't meet it now, but when the deadline is here, there is another factor, whether they could have met it. And if I were convinced at the time that December 1968 arrived that they could have met it had they gotten right into it and done a job, then I would not be for extending the time, but would move into enforcement, and if I were convinced at that time that they had extended every effort right from the beginning and had diligently pursued this and still could not meet it, then I would at that time consider giving them more time.

This is a policy that the Sanitary Water Board has adopted and follows, and we have followed. We have extended time for industries and cities, sometimes several times, if we were convinced that they actually started in immediately and were doing a job. If not, we moved into the enforcement area.

This is my position, and I would be willing to review any of these at the time the deadline is reached on the two bases.

MR. STEIN: Right. I think Mr. Klassen's position is very clear -- at least, to me it is. Being faced with a deadline, you have two propositions in this field: If an industry or a municipality or any polluter is making a diligent effort, and this is a problem, sometimes you extend the deadline before the time appears. If you are not convinced that happens, you often wait for the deadline to come, and then you make your judgment on what to do, either to proceed further or give him an extension.

I don't think that is an unusual position. We have all taken that many times.

I think we now have the views of the people here.

Does anyone have anything further, or do you want to pursue this any further, or take another item up? Do you have any other items that you want to get back to the Secretary, or recommendations?

MR. POSTON: Mr. Chairman, all of this comment has been done with the understanding that this does not mean that industries slow down and just meet this schedule, but that everything will proceed as rapidly as possible, and if earlier schedules can be met, why, they will go ahead with that. Is that right?

Closing Statements

MR. STEIN: Yes, that is my understanding.

By the way, I think the programs of all three reflect that, unless I am mistaken, but I think that has been emphasized over and over again.

MR. EGAN: They reflect it, and the only reason I took the stand was the way the question was put to us. You talked about this date, or the date in 1970.

MR. STEIN: Well, we put the other question first, whether you thought the 1970 date was reasonable.

MR. EGAN: 1968.

MR. STEIN: You recall the way we put the issue. Before we got into the reason, we asked you if you were in favor of the extension, and the answer from you, you and you, was yes, and there it was no. Only then did we go to the question about whether you thought the 1968 date was reasonable, because once the conclusion is reached, then I think the Secretary will want to know the reason.

This obviously is going to be his first question once he gets this recommendation, and I think many of the conferees in their discussion came back to this many, many times. You can't expect them to do anything else but to answer this question.

I think we have pretty well gone through this, but do we have any other suggestions, or problems, or recommendations? We have an open door here now to Secretary Udall on this where he can help with something in Lake Michigan.

Let me bring up this question and see if you want to pursue this at all. Do you want to do anything or make any suggestion to him about that nutrient problem in Lake Michigan? You can suggest this through the enforcement or any other technique. That is, the cladophora problem and all the States involved on the lake, or do you want to let that go?

I think I am going to have to say that this was discussed and that this was a lake-wide problem as far as the conferees could determine.

MR. EGAN: It was suggested that the States join together in an effort to do something about this, wasn't it?

MR. STEIN: Do you want them to join together with the Federal Government in a joint effort?

MR. EGAN: Well, the Federal Government would have to be in on it, or else I am sure they would not get the proper cooperation.

MR. KLASSEN: I think there is valid reason, Mr. Chairman, for the Federal Government doing this. You have the information and if you wanted to call an enforcement conference on it similar to this, you are justified in doing it on the same basis that this one was called. This one was not called at the request of either governor.

MR. STEIN: I know that.

MR. KLASSEN: It was called on the basis of the Secretary having all of the information, and he felt that there was an interstate problem.

It would seem to me that the very same reasoning could be applied to the nutrient problem, to include the States of Wisconsin and Michigan.

MR. STEIN: All right. I think we also have to probably report to the Secretary that, as far as we can tell from the conference, the program of providing waste treatment for all Federal installations is practically completed.

MR. POOLE: Yes.

MR. STEIN: There are none that are not meeting requirements. This seems to be correct.

There are no recommendations we are going to make on dredging, because we have an agreement with the Corps.

MR. BACON: You have an agreement on the dredging.

MR. STEIN: Yes. There is nothing coming out of here that is new.

The only thing that I saw that was new was what you mentioned about how they could stop that leakage when they go out to dump. That isn't for the Secretary.

MR. BACON: But if you followed your own recommendations, there wouldn't be a barge out there in the first place.

so that you wouldn't have to worry about leaking.

MR. POSTON: That is what we are hoping for.

MR. STEIN: We are doing our best.

You know, sometimes matters are just about as successful and move as fast with respect to another Federal agency as we do with respect to a major industry.

MR. POSTON: Mr. Chairman, would this be the time to ask about a next progress meeting?

MR. STEIN: Yes.

MR. POSTON: I think that we should continue these on a six-month basis.

MR. MORTON: Make it a year from now.

MR. POOLE: Once a year I think would be better. As soon as you finish writing one report, you start writing another one.

MR. STEIN: Is this all right, next year? The Secretary would call one anyway, but let's leave it that we will meet in a year, unless the conferees agree that anything productive can come forward and we will have one sooner. The same people will be around and we will be in touch with you before we call another one, especially if it desirable to call one sooner.

MR. BACON: This matter, of course, of the criteria on the Little Calumet and the Grand Calumet does not conform with the State of Illinois criteria for tertiary treatment, and I think if it takes us five and ten years to get tertiary treatment, it is going to take Indiana cities five and ten years to get theirs, and I don't think we should wait very long to decide which set of criteria are going to control at that point.

MR. KLASSEN: Right on that point, Mr. Chairman, Vinton, did we decide that the Technical Advisory Committee was going to get together and get into it at the same time?

MR. BACON: We are faced with two sets of facts, as far as we are concerned, as operators:

1. The smaller bar graph, which is what we have to meet and we are tooling up to meet within ten years. Everything is pointed that way. This is not lip service.

Now, it is going to be rather meaningless for the District to do this unless the effluent is up to meet those standards on this side of the line for anybody else.

We just don't think that that is the way it should be done, and I think you have to bear in mind that under the Supreme Court decree, our quantity of dilution water I believe we can estimate is going to steadily decline, so I think this question here is one that should come before this conference in the not too distant future for a formalization.

MR. STEIN: If we are going to consider this, we may have to meet in six months. This is a tough one.

Now, I am not sure, and you people may want to think about this a little bit, how you want to resolve this, through the conference or the standards-making process. It is true that in this operation, you try to get together and get it lined up.

MR. EGAN: Mr. Chairman, couldn't we think about meeting in six months, unless things were going along so well that it wasn't necessary?

MR. STEIN: Right.

MR. EGAN: Rather than talking about a year from now, and then call it in six months if we have to? Let's do it the positive way.

MR. STEIN: I think that might be a better suggestion if we are going to hit this problem that Mr. Bacon brings up, and this is a key problem.

MR. EGAN: It is.

MR. STEIN: I think we may be ready to get together on this in six months, or sooner, but my guess on this is that you would probably need a staff meeting on issues like this more than we would on the ordinary Technical Committee for those other problems we are thinking of, because this is a pretty involved problem.

I would think you would want a backup of a technical staff. Perhaps you would have to arrange for a meeting of the chiefs or their first deputies in all the jurisdictions to try to get together on the problem.

Do you want to entertain the idea of trying to work up at least a position paper?

MR. POSTON: We will look into this and see what we can do.

MR. STEIN: How about getting a report?

MR. POSTON: Right.

MR. STEIN: At least, laying out the positions of the various agencies, and see if we can see our way clear to doing this.

If we come to an agreement, maybe we should consider reconvening the conference if we are ready to go ahead and be able to handle this. Or do you whish to handle this in some other way?

I agree with you, Mr. Bacon. We have to get at these problems. This is just the other part of the problem that we have had right here, in which one State got in a standards situation on a time schedule which is a little different from its neighboring State.

Once we get into a different number in the same stream for a neighboring State, we are going to have to do quite a bit of this, and I think you put your finger on a key issue.

Closing Statements

MR. BACON: I think there is one other thing. You recall that the slides show that these are combined sewer problems. That is the bigger problem.

I believe in a very short period of time you are going to have to make that decision too, as to what is going to come out of this conference.

Let's face it. We have talked about the effluents from industry. We have talked about the water quality, and so forth. Yet there is a great, big chunk of the pollutional problem that is going to figure into our side of the line in our big system here. And certainly, what they are going to do on the combined sewers, whether it is going to be a separation or whether it is going to be an overflow treatment, or whether it is going to be something like a tunnel, is beside the point. But I believe we are going to start a four or five-year point on construction, and, again, it is not going to help us and we are going to defeat our own program on an interstate basis if we are going to have combined sewage overflows into this area.

MR. STEIN: Didn't we once make a recommendation at the conference on combined sewers?

MR. POSTON: Yes, I think we did.

MR. STEIN: I do think we have to come up with a coordinated program on the combined sewers. You are not alone.

In Washington, we could not lick the problem until we got into the combined sewer problem.

Fortunately, we didn't have any jurisdictional problems there.

I don't think we are going to lick the problem in New York City without licking combined sewers; and I don't think we have too difficult a jurisdictional problem there either. We surely have a terrible construction problem. But here we are. We are just going to have to get at this to get at the problem of working this out.

Now, the determination, as you know, has been made in the Congress not to embark on a tremendous Federal financing of combined sewers, but to have the jurisdictions experiment awhile to see if there could be a cheaper way of doing this, and possibly total separation. I assume that part of the work you are doing with your tunnel refers to this.

The problem, it seems to me, is (1) you have to decide to work on your combined sewer problem; and (2) you should at least get systems of handling the stormwater overflows that are compatible with each other, if we can.

MR. POOLE: I don't remember just what we said in Lake Michigan. But, in general, in all of our reports we have indicated ten years on our combined sewer problems, and then mentioned some specific ones here earlier, but I quite agree with Mr. Bacon, that this is a problem that we have to come to grips with.

MR. STEIN: You are proceeding on a straight separation, I believe, aren't you?

MR. POOLE: No. We are sort of waiting to see if something cheaper comes along.

MR. STEIN: Well, so is everybody.

Let me say this, and this may be a point, Mr. Bacon. I think that you probably, and some of the other cities, have moved ahead. We could at the next session of the conference, just as we have gone into the cladophora here or the alewife situation, have a report or see if we can work up a report on where we stand on the combined sewers here.

I would like to make one more point. I think I am going to have to report back to the Secretary on the alewife situation.

The report we got here from Dr. Smith was as clear as I have seen, but I still suspect that what I said before he talked is true--that the alewives did cause a pollution situation, but the solution to that problem is probably going to come from the Fish and Wildlife people, and not from our discipline.

I think we would be kidding ourselves if we thought that we could come up with a solution.

Are there any other comments or statements?

MR. EGAN: Did we decide on meeting in six months?

MR. STEIN: Yes, six months, unless the conferees all agree that things are going so well that we don't have to meet.

MR. EGAN: I think that's good, because things might be going so well that we would go back to the December 31, 1968, date.

MR. STEIN: All right. I can see why you are President.

(Laughter.)

The conference is adjourned.

(Whereupon, at 5:55 p.m., the conference was adjourned.)

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